J. H. Hornsby

A

SYSTEM

OF

MATERIA MEDICA

AND

PHARMACY:

BY

J. MURRAY,

LECTURER ON CHEMISTRY, AND ON MATERIA MEDICA AND PHARMACY, EDINBURGH.

WITH NOTES

BY N. CHAPMAN, M. D.

PROFESSOR OF MATERIA MEDICA IN THE UNIVERSITY OF PENNSYLVANIA.

IN TWO VOLUMES.

VOL I.

NEW-YORK:

PUBLISHED BY SAMUEL WOOD & SONS,

NO. 261, PEARL-STREET;

AND SAMUEL S. WOOD & CO. NO. 212, MARKET-ST.

BALTIMORE.

1821.

[III]

TO J. MURRAY, M. D. &c. &c.

My Dear Sir,

I HAVE had printed the present edition of your System of Materia Medica and Pharmacy, to serve as a *Text Book* to my Lectures.

In making this selection, I am not sensible that I was, in any degree, influenced by the partiality of friendship. As an elementary treatise, the work has confessedly no ordinary pretentions, and it seemed to me to be peculiarly well suited to my purpose, as exhibiting within a narrow compass, a very correct view of the existing state of the science.

Nevertheless, you will perceive in the notes which are added, that I do not always entirely agree with you. The differences of opinion, however, between us are trivial, and I am sure I need not apologize to you for the critical animadversions which I have occasionally indulged.

It was originally my intention to have incorporated with the work, many articles, chiefly the indigenous productions of this country, which, though imperfectly known to the practitioners of Europe, have fully vindicated their titles to a place in the Materia Medica. But, I found the undertaking could not, in this way, be so advantageously executed, and I was also restrained from attempting it, by obvious considerations of delicacy and propriety. I have therefore determined to make these materials a subject of a distinct publication, which I hope will appear at no distant period.

This province of science has not altogether been neglected. My distinguished predecessor in the chair which I now occupy, has done much towards its improvement,and several of the graduates of our school, have, in their inaugural dissertations, signalized their talents by very successfully investigating the properties of a considerable number of our native medicinal vegetables. Not a little, however, still remains to be accomplished. I shall, in the work which I contemplate, endeavour to present a synopsis of all that has been written upon the subject, together with some new matter, the result of my own observations and inquiries.

Thus you see, that like yourself, I retain a desire of being useful. But how different is our fate. You already are celebrated throughout the world, as among the most triumphant cultivators of science. I, only known within a very limited sphere, as the humblest of its votaries.

In looking back on the scenes of my life, there are none to which I recur with greater satisfaction than those of the time which was passed in communion with you, and my other friends at Edinburgh.

I have cherished, and shall never cease to cherish for you all the fondest recollections.

I am, dear sir,

Very truly and respectfully,

Yours, &c.

N. CHAPMAN.

Philadelphia, Nov. 1, 1815.

AUTHOR'S PREFACE.

THE Elements of Materia Medica and Pharmacy, which I published several years ago, were principally designed to be subservient to the Course of Lectures I deliver on these branches of Medicine. Having changed the plan of these Lectures for one, which, though not perhaps preferable in itself, I consider better adapted to this mode of instruction, the republication of that elementary treatise appeared to me unnecessary, and my other engagements would not allow of my undertaking a work adapted to the new arrangements of my Course.

The demand, however, for the former treatise, since the impression of it was exhausted, has been such, as to have convinced me that the plan on which it is executed is possessed of some advantages, independent of the object I had originally in view. I have been induced, therefore to publish, not indeed a new edition of it, but a more enlarged work on the same plan. Considering it as no longer subservient merely to my Lectures, I have endeavoured to render it more complete in itself, so as to form a concise System of Materia Medica and Pharmacy, which, without including the minute details, shall embrace the principles and the more important facts connected with these departments of medical study.

Under the classes of the Materia Medica, I have placed those articles only which are employed in modern practice, without taking any notice of the numerous inert substances which an undue regard to the authority of antiquity has too long retained in publications of this kind. The Pharmacopœia of the Edinburgh College I have taken as the basis of the pharmaceutical part of the work, having given a translation of its processes, while I have also introduced whatever preparations of importance are peculiar to the London and Dublin Pharmacopœias. And I have ad-

ded those corrections in the principles and processes of Pharmacy, which the récent discoveries in Chemistry have rendered necessary.

To the history of the articles of the Materia Medica, I have annexed, at the end of the first volume, a view of that arrangement in which they are classed, according to their natural affinities. This, besides affording a contrast with the classification of these substances according to their medicinal powers, will be of some advantage to those attending my Lectures, and enable them to derive more assistance from the present publication as a text book, as it presents an Outline of the arrangement of the Course.

CONTENTS

OF

VOLUME FIRST.

INTRODUCTION.

MEDICAL Science, considered as relating strictly to the treatment of disease, may be presented under two points of view. Under one, the symptoms of diseases are described, their causes are investigated, the indications are delivered by which their cure is to be attempted, and the remedies are enumerated by which these indications are to be fulfilled. When this method is followed, a previous knowledge is supposed of the natural history, properties, and medicinal powers of the substances employed as remedies; and they are no farther subjects of attention, than to point out their applications to particular cases, and sometimes the cautions which, from peculiarity of circumstances, require to be attended to in their administration.

But the subject may also be presented under another light. The symptoms of diseases, their causes, and indications of cure, may be supposed to be known, and the remedies themselves become principally the object of study,—their natural characters, their sensible qualities, their effects on the living system, and their applications to the treatment of morbid affections, forming so many subjects of description or investigation. This constitutes the department of Materia Medica,—understood in the most extensive signification of the term.

The medicinal powers of natural bodies are connected with their chemical constitution; they frequently reside not in the entire matter composing them, but in principles capable of being extracted and obtained in an insulated state, and which in this state can often be employed with peculiar advantages. When given in combination too, these substances are liable sometimes to act on each other, and from the changes arising from these mutual actions, to suffer a change in their properties. Hence arises the necessity of a strict attention to their chemical composition; and a description of their constituent principles, and of their chemical relations, so far at least as these influence their actions as remedies, belongs to this department of Medicine.

Besides this, we are often able by chemical combinations, to modify the powers of these substances, to give them more activity, and in many cases, even by the production of new compounds, to obtain remedies which nature does not afford. These are the leading objects of Pharmacy, the principal processes of which are chemical, and which is evidently subordinate to Materia Medica.

Regarding all these objects of inquiry as belonging to one department of Medicine, this department naturally falls under three divisions. Under the first may be delivered those principles which are common to Materia Medica and Pharmacy, those which embrace the chemical relations of bodies, and the changes to which they are liable, so far as is connected with their medicinal operations,—forming what may be named Pharmaceutic Chemistry. Under the second is placed the history of the substances employed as remedies, constituting what is regarded as Materia Medica in the more limited sense frequently attached to the term. And under the third may be considered the processes to which these substances are subjected, with the view of preparing them for administration, forming what is more strictly denominated Pharmacy. On these divisions is founded the arrangement of this work.

PART I.

OF THE GENERAL PRINCIPLES OF PHARMACEUTIC CHEMISTRY.

PHARMACEUTIC Chemistry is that branch of chemical science which investigates the composition of bodies, and considers their mutual chemical relations, so far as these are connected with their medicinal properties and applications. It connects the doctrines of Materia Medica and Pharmacy, and forms a proper introduction to the study of each; an exposition of its principles being necessary in delivering the history of the articles of the Materia Medica, and being not less indispensable in explaining the operations of Pharmacy. It includes two subjects, *first*, the analysis of bodies, so far as relates to the enumeration of their constituent principles; and, *secondly*, the general operations to which they are subjected in their preparation as remedies.

CHAPTER I.

OF THE CHEMICAL ANALYSIS OF THE ARTICLES OF THE MATERIA MEDICA.

THE ultimate object of chemical investigation, is to discover the composition of bodies; and the result of these investigations is the reducing them into two classes, those which are Simple, and those which are

Compound. The former are such as consist of parts perfectly alike; the most minute particles into which a simple body can be resolved, retaining all its essential properties, and being similar to each other. Compound substances, can, on the contrary, be resolved into parts different in their qualities from each other, and from the compound which they had formed.

It is from the union of simple substances that compounds are produced. When two simple bodies are placed in contact, under certain circumstances, an attraction is often exerted by the particles of the one to those of the other: they unite and form a compound, having peculiar properties. These compounds are farther capable of combining with other simple bodies, or with each other, which gives rise to a series of bodies, still more extensive; and these again are capable of new combinations, or of such intimate mixtures with each other, as to form many peculiar substances. There are thus produced, from a few simple substances, all the products of nature, and all those which are the results of the operations of art.

It is the province of Chemistry to trace these combinations; to determine whether bodies are simple or compound, and, if compound, to ascertain the number of their constituent principles, the proportions, and the modes in which they are combined.

The general process by which these objects are attained, is termed, in the language of chemistry, Analysis. It is merely the separation of a compound body into its constituent parts, and is effected either by the agency of heat, or by the exertion of a superior attraction.

The analysis from the application of heat, differs according to the composition of the body analyzed. If a compound, consisting of two simple substances, be exposed to heat, it in many cases happens that the mutual attraction by which its principles were united, ceases, and a decomposition or separation of these principles takes place. This is an example of pure analysis; no change being produced, but merely the separation of

the component parts of the compound, so that each is obtained in its original state.

An analysis more complicated is that where several substances are combined together, in such a manner that their attractions are reciprocally balanced and one compound is formed. When a compound of this kind is exposed to a high temperature, this balance is frequently subverted, and the compound is decomposed. But its constituent principles, instead of passing off pure, enter into new combinations with each other, and form other compounds, each of which may be collected, and in its turn analyzed. It is in this manner that vegetable and animal substances are acted on by heat; the products afforded by their analysis are not such as pre-existed in them, but are compounds formed during the decomposition, from new combinations of their ultimate constituent principles. This is what is named False or Complicated Analysis.

Chemical analysis is also effected by the exertion of a superior attraction. If a compound be placed successively with different substances, in situations favourable to the operation of chemical action, one or other of these substances may exert a superior attraction to one or other of its component parts; a decomposition will be produced, and from the products the constituent principles of the compound as well as their proportions may be determined.

As compound substances can combine together so as to form a new compound, it is obvious that this compound may be resolved either into the immediate principles from the union of which it has been formed, or into those of which these consist. It is necessary, therefore, that these should be distinguished. The former are accordingly named the Proximate Principles of a compound; the latter the Ultimate Principles. The proximate principles are of course compounds; the ultimate principles are the elements of these compounds; and the results of analysis are extremely different according as one or other of these is obtained.

When by analysis the constituent principles of a body have been obtained, they may often be combined again, so as to reproduce the substance analyzed. This operation is named Chemical Synthesis; and when it can be effected, is the surest proof of the accuracy of the analysis.

In analyzing the various products of nature, we arrive ultimately at substances which we are unable to decompose, and which are therefore regarded as simple. The absolute simplicity of these is not indeed established; for our inability to decompose them may not arise from this, but from the imperfection of our mode of analysis; and it is even probable, that all the substances which are yet known to us may be compounds, and that a more refined chemistry may discover their composition. Until this be accomplished, however, they are regarded as simple, and they are so with regard at least to our knowledge of them. As the ultimate principles, therefore, of all analysis, they are first to be considered in proceeding to the general analysis of the articles of the Materia Medica.

Of these bodies, Oxygen is the most important. There is no simple substance which exerts an attraction to so many others, or which gives rise to such important compounds. With a few exceptions, indeed all the productions of nature are either capable of combining, or are already combined with this principle, and the developement of its agencies constitutes the most extensive and important part of chemical science.

Oxygen always exists in the gaseous state: when it enters indeed into combination with other substances, it often becomes concrete; but its properties are at the same time changed, and its descriptive characters are therefore taken from it as it exists in the aërial form. Like other gases it is invisible and elastic; its specific gravity is rather greater than that of atmospheric air; it is absorbed by water, but in a very small proportion.

The distinguishing properties of oxygen gas are those of supporting respiration and combustion. An animal lives much longer in this air than it does in any other;

and combustion in it is more vivid and durable. It is the only air indeed, which, strictly speaking, can support either of these processes; other aëriform fluids doing so only from the oxygen they contain.

Its capacity of supporting combustion is more particularly to be assumed as its characteristic chemical property; combustion being nothing but the combination of oxygen with combustible bodies, accompanied with the emission of heat and light. It also frequently, however, enters into combination without the phenomena of combustion being apparent, more especially when the absorption of it takes place slowly, or when it is transferred from a compound in which it exists to another substance. The combination of a body with oxygen is termed Oxygenation, or Oxidation. The products of this combination have either certain common properties, belonging to a class of chemical agents long distinguished by the appellation of Acids; or they are destitute of these properties, and they then are denominated Oxides.

Oxygen forms one fourth part of atmospheric air; and it is principally on its agency that the many chemical changes produced in bodies by that air depend. Combined with another elastic fluid, hydrogen, in the proportion of 85 parts to 15, it forms water, the substance which has the most extensive operation in promoting chemical action by the fluidity it communicates, and which more directly produces many important chemical changes, by affording oxygen to bodies. This element exists as a constituent principle of all acids and communicates to them their energy of action. It has more lately been established, that it is also an ingredient in the composition of the alkalis and earths, and that it is therefore the principle of alkalinity as well as of acidity. With all the metals it combines in different proportions, communicating to them a greater susceptibility of chemical action, and greater activity in their relation to the living system; and it exists as a constituent part of nearly all the vegetable and animal products. Hence

no principle is more extensively diffused, and none has a more marked influence in the combinations into which it enters.

The elastic fluid which, along with oxygen gas, composes atmospheric air, is named AZOTE or NITROGEN. Its chemical agency is less powerful, nor does it possess any very remarkable property by which it can be characterized; hence it is distinguished rather by negative qualities. It is lighter than oxygen gas, is incapable of supporting combustion or respiration, is scarcely sensibly absorbed by water, and is not combustible in the strict sense of the term; for although it combines with oxygen, the combination is not rapid; it does not, after it has commenced, proceed of itself, and is not attended with any sensible emission of heat or light.

Nitrogen gas forms three fourths of atmospheric air, the remaining fourth part being oxygen gas. In more intimate combination with oxygen, and in that proportion in which they are mutually saturated, it forms a very powerful acid, the nitric acid; and in lower degrees of oxygenation it forms compound gases which have no acid powers. With hydrogen, and probably a portion of oxygen, it forms ammonia, one of the alkalis; it exists in some vegetable substances, and is a constituent principle of nearly all the varieties of animal matter. This substance had been usually regarded as simple. The recent researches which have arisen from the application of galvanic electricity to chemistry, have established some singular facts with regard to it; whence the conjecture has been formed that it is a compound, and in particular, that it is connected in chemical constitution with hydrogen; but the subject is still involved in such obscurity as to preclude any certain conclusion.

ATMOSPHERIC AIR, of which oxygen and nitrogen are the essential constituent parts, has merely the aggregate properties of these two gases, their combination being so slight that no new powers are acquired from it; and as the oxygen is the more energetic ingredient, the chemical agencies of this air depend chiefly on the operation of this principle. It yields oxygen to a number of

substances, with more or less rapidity, and thus changes their chemical constitution. It sometimes acts too by communicating humidity; and in a few cases, by affording an elastic fluid, carbonic acid gas, which is diffused through it in small proportion. Its nitrogen exerts no active power, but apparently serves merely to dilute, and thus to moderate the action of the oxygen gas.

Hydrogen is another elastic fluid, which in the system of modern chemistry has been regarded as elementary, and the importance of which, as a principle opposed to oxygen in its chemical powers, recent discoveries appear to establish. In its aërial form, in which form only it can be obtained uncombined, it is the lightest of all the elastic fluids, and the lightest substance therefore whose gravity we can ascertain. It is distinguished farther by its high inflammability; it burns whenever an ignited body is approached to it in contact with atmospheric air, and explodes if previously mixed with the air. The product of its combustion is water, which is therefore considered as a compound of it with oxygen. Combined with nitrogen, it forms ammonia: with the primary inflammables, sulphur, carbon and phosphorus, it forms compound gases: it dissolves even some of the metals, and it is an abundant ingredient in vegetable and animal substances.

Water, of which hydrogen is the base, is a substance extremely peculiar in its chemical relations. Its power of combination is extensive, there being few substances on which it does not act, or with which it does not combine; yet in these combinations no energetic action is displayed; it in general scarcely produces any alteration of properties; and hence its most important operation is the communicating that state of fluidity to bodies which is in general necessary to their mutual chemical actions. It is more peculiarly the solvent of all saline substances, and of the greater number of the earths; and it dissolves many of the vegetable and animal products. When it communicates oxygen, it produces more important changes. Several of the me-

tals are slowly oxidated by it; and when they are dissolved by acids, it often acts by affording to them that oxygen which is necessary to the solution. Vegetable and animal substances often suffer chemical changes from the oxygen which water imparts, as well as from the fluidity it communicates, favouring the re-action of their constituent parts: and in their decomposition at elevated temperatures, the elements of the water they contain enter into the composition of the products which these decompositions afford.

There are three substances, formerly supposed to be simple, distinguished by the property of inflammability, and hence named Simple Inflammables, which exist as constituent principles of a number of natural products. These are carbon, sulphur, and phosphorus. Recent discoveries appear to favour the conclusion, that the inflammable matter of each of them has not yet been obtained perfectly pure; but that in the state in which they are presented to us, it is combined with a small portion of oxygen, and perhaps of hydrogen; and some analogies even lead to the conjecture, that the ultimate bases are metallic. In this compound state, however, they are destitute of the metallic splendour, opacity, and specific gravity, and are connected chiefly by the common property of inflammability. When united with oxygen, they form acids.

Carbon. The ultimate base to which the name of carbon ought to be appropriated, is probably, still unknown to us; but there are several substances of which it constitutes the greater part, and of course in which it exists in a state more or less pure. Wood charcoal in burning, is almost entirely consumed, forming with the oxygen with which it combines a peculiar elastic fluid, carbonic acid, and leaving only a small residuum of earthy, saline, and metallic substances. As a discriminating appellation of the pure inflammable matter which thus combines with oxygen, the term Carbon was introduced, and it denoted therefore simply this matter free from the other substances mixed with it in charcoal,

and apparently not essential to its constitution. It was afterwards discovered, that the Diamond, which was known to be a combustible body, affords in burning precisely the same product as charcoal, and hence therefore consists of the same inflammable matter. Different opinions were advanced with regard to the difference between charcoal and diamond; but from galvanic experiments it appears, that in charcoal the inflammable base is combined with a little hydrogen, in diamond with a very minute proportion of oxygen. In the substance named Plumbago, it is united with a small quantity of iron; it has not therefore been entirely insulated; but it is to this inflammable base common to all these substances, and composing nearly the whole of their weight, that the term Carbon is understood to be appropriated.

Carbon, besides existing as an element in the composition of many mineral substances, is an abundant ingredient in the products of the vegetable and animal systems. Not being volatile, it forms the principal part of the residual mass when these are decomposed by heat; and it is by this decomposition of vegetable matter, especially of the wood of plants, that it is obtained in the form of charcoal. With oxygen, combined in different proportions, it forms two elastic fluids, carbonic oxide, and carbonic acid. With hydrogen and oxygen, in different proportions, it forms various inflammable gases. Alcohol, or pure ardent spirit, which is the product from saccharine matter by fermentation, is a similar compound; and ether, which is formed from alcohol by the action of acids upon it, is of the same composition with a larger proportion of hydrogen. Lastly, this ternary combination of carbon, hydrogen, and oxygen, in various proportions and modes of combination, appears to constitute the principal varieties of vegetable matter.

Sulphur is found in nature principally as a constituent part of mineral bodies. It exists combined with many of the metals; and combined with oxygen, form-

ing sulphuric acid, it enters into the composition of a number of saline and earthy compounds. It is highly inflammable; in burning it combines with oxygen, principally in that proportion which forms an elastic fluid, highly pungent and suffocating, sulphurous acid. With a large proportion of oxygen, it forms a dense inodorous liquid acid, sulphuric acid. With hydrogen, it forms an inflammable gas, sulphuretted hydrogen, which exists in nature impregnating water in the sulphurous mineral waters; and this compound, either alone, or with an additional proportion of hydrogen, forming what is named super-sulphuretted hydrogen, enters into combination with alkalis, earths and metallic oxides, forming several important pharmaceutic preparations. Lastly, sulphur exists as a constituent part of animal substances: hence, sulphuretted hydrogen is generally evolved in the decomposition of these by heat or putrefaction: it has also been detected in the composition of a few vegetables. This inflammable substance appears, from galvanic experiments, to consist of a peculiar base, not yet obtained insulated, combined with small proportions of hydrogen and oxygen: and it is probably this base which enters into the preceding combinations.

Phosphorus, like sulphur, is found chiefly as an ingredient of animal matter. Combined with oxygen, in the state of an acid, it also exists in several of the natural compounds of the mineral kingdom. It is of a soft consistence like wax, semi transparent, and of a white or yellowish colour; it is so highly inflammable that it burns spontaneously when exposed to the air. It combines with two proportions of oxygen, forming two acids, the phosphorous and the phosphoric. With hydrogen it forms a gas highly inflammable; and it unites with sulphur and with the metals. It too contains minute quantities of oxygen and hydrogen, and its simple base is therefore unknown.

The class of Metals is an extensive one, the substances to which this name is appropriated being numerous, and the number being still farther augmented, if

the lately discovered bases of the alkalis and earths are to be regarded as metallic. The physical properties, characteristic of the metals, are opacity, great lustre, density, and tenacity under the two modifications of ductility, and malleability. These are possessed in different degrees by the different metals, and if the bases of the alkalis and earths are to be admitted as metals, the property of density cannot be considered as distinctive, as some of these are even lighter than water. With regard to chemical properties, the metals are fusible, in general not volatile except at very intense heats; they are capable of combining with oxygen, with hydrogen, sulphur, carbon, and phosphorus, with each other, and when oxidated are capable of uniting with acids, alkalis, and earths.

Of these combinations, that with oxygen is the most important; and in relation to the object of this outline, the only one requiring any farther observation. This combination is effected in various modes. When heated in contact with the air, they attract its oxygen: if the temperature be very highly elevated, as in that produced in the galvanic circuit, they display during this oxidation the phenomena of combustion; even if the temperature is less elevated, several of them burn more or less rapidly; but the greater number are oxidated more slowly, and without any sensible extrication of light. Several metals are slowly oxidated by water, or by the joint action of air and water at natural temperatures. And all of them can be oxidated by acids, the acid either directly imparting oxygen to the metal, or enabling it to attract this principle from the water which is present.

The compounds of metals with oxygen belong in general to the order of oxides. They are destitute of the physical properties of metals, and have an earthy like appearance. Two or three metals acquire, in their highest state of oxygenation, acid powers.

In combining with oxygen, different metals unite with very different quantities of it. Each of them combines too with different proportions of oxygen, giving

rise to the production, from the same metal, of oxides having very different properties. These proportions have been supposed to be determinate, but there is every reason to believe that they are not so, except from the operation of external circumstances connected with the oxidation; that the natural tendency of the law regulating these combinations, is to unite the metal with the oxygen, in quantities indefinite, from the *mini num* to the *maximum*, and that uniform and determinate proportions are established in particular cases, only by causes foreign to the reciprocal attraction whence the combination results,—a circumstance of much importance, as is to be afterwards pointed out, with regard to the pharmaceutical processes on the metals.

When the metals are combined with oxygen, they become capable of combining with the acids, and they then acquire greater activity and power of chemical action. This previous oxidation of a metal is always necessary to its combination with an acid, and hence, when acids act on metals, they first impart to them oxygen, or enable them to attract oxygen from the water, or sometimes from the air, and then combine with the oxide that is formed. As the same metal is capable of existing in different states of oxidation, so by combining in these states with the same acid it forms very different compounds; and these compounds are farther diversified by the different proportions of acid combined in them.

Metals are rendered active on the living system, principally by being thus combined with oxygen, or farther combined with acids. In their metallic state, they seldom produce any sensible effect, and any effect they do produce appears to arise from their being chemically acted on by the gastric fluids. When oxidated they become much more active; and still more so when the oxide is combined with an acid. And even the degree of oxygenation, considerably influences their powers; so that from the same metal preparations of very different degrees of medicinal activity may be obtained, though all agreeing in the kind of action they exert.

It would be foreign to the object of this sketch to give the description of the individual metals: it is sufficient to have stated with regard to them these general facts. Few of them exist as common ingredients in the composition of natural substances, with the exception of iron.

A class of substances, possessing certain common properties, the ultimate principles of the various compounds, not metallic or inflammable, which occur in the mineral kingdoms, had been distinguished by the appellation of EARTHS. An analogy had often been observed to exist between these substances and metallic oxides; and the conjecture had even been advanced, that they are of similar constitution, or consist of metallic bases combined with oxygen. By a train of investigation, originating in very different analogies, the composition of the earths has been established, and their bases discovered to be substances previously unknown, and possesssing general properties, so nearly allied to those of metals, as to be sufficient perhaps to justify the placing them in that class; yet still so far different as to afford some reason for regarding them at least as a peculiar order.

The Primary or Simple Earths, as they are named, to distinguish them from the various earthy aggregates which exist in nature, have been described as substances insipid, insoluble in water, fixed, and nearly infusible by heat, uninflammable, and capable of combining with acids, so as to neutralize the acid properties. All these characters are not equally appropriate; for there are several of the earths which have a pungent taste, and are soluble in water to a considerable extent, and all of them may be fused by very intense heats.

The principal earths are Silex, Argil, Magnesia, Lime, Barytes, and Strontites; Zircon, Glucine, and Ittria, having more doubtful claims to be ranked in this class, or existing in such minute quantities as to be comparatively unimportant.

SILEX is an abundant ingredient, not only in mineral substances, but is frequently contained in vegetable

products, and forms part of the earthy residuum of their decomposition. It is tasteless, nearly infusible and insoluble in water, and is peculiarly distinguished by its inertness, and comparatively limited range of combination; among the acids it combines only with the fluoric, and even scarcely neutralizes its properties. It unites with the fixed alkalis, and by fusion with the other earths and the metallic oxides.

Argil is insipid, soft to the touch, infusible, insoluble in water, and particularly distinguished by forming with that fluid a ductile plastic mass, which hardens and contracts considerably when heated. With the acids it forms compounds, which have generally a sweetish styptic taste, and which possess, to a certain extent, the property of astringency.

Magnesia exists in the form of a very light white powder, smooth and impalpable; infusible, insoluble in water, and not forming with it a coherent paste; it has a slightly bitter taste, changes the more delicate vegetable blue colours to a green, and combines with acids, forming compounds, in general very soluble, and having a bitter taste. In its pure form it is medicinally employed as an antacid, and its saline compounds have in general a cathartic power.

Lime, or Calcareous Earth, displays still greater energy of action. It is so far soluble in water, as to communicate to the solution a very harsh styptic taste, and the power of changing the vegetable colours to a green. Being usually obtained by the decomposition of lime-stone, chalk, or marble, by heat, it is in the form of a hard mass; but when it imbibes water, either directly or from exposure to the atmosphere, it splits, and falls down into a white powder perfectly dry. It is infusible. Combined with the acids, it neutralizes their properties. Its action is considerable on the animal system. Directly applied to animal matter, it acts chemically, producing decomposition, and thus operating as an escharotic. Given in solution, it exerts an astringent and tonic power, which power is also dis-

played in several of its saline combinations; and by its chemical agency it acts as an antacid, and, as has been supposed, likewise as a lithontriptic. Its base has been obtained, though not perhaps perfectly insulated; it has the metallic lustre, and appears to be highly inflammable.

Barytes surpasses lime in energy of chemical action. Like it, when in a solid mass, it absorbs water rapidly, and falls into a dry white powder; its taste is harsh and caustic: when water is combined with it, it fuses by a heat comparatively moderate; but when this is dissipated, the heat requires to be raised to a much higher point. It is more soluble in water than any of the earths, cold water dissolving a twenty-fifth of its weight, and boiling water even more than half its weight; this latter solution depositing as it cools, transparent prismatic crystals. Its solution changes the vegetable colours to a green. This earth combines with the acids, and appears to exert to them very powerful attractions, as it decomposes their compounds with the other earths and the alkalis,—a circumstance probably owing, however, rather to the insolubility of the compounds it forms, than to any superior force of attraction. It exerts affinities to the other earths, and combines also with sulphur and phosphorus. Of all the earths, it is the one which acts most powerfully on the living system. Even in small quantities, it occasions unpleasant symptoms, and its preparations prove poisonous to animals. From this quality, and from another, the great specific gravity of several of its saline combinations, particularly the native sulphate and carbonate, barytes was often more peculiarly supposed to be of a metallic nature. Its decomposition has been effected by the application of galvanism, and a base obtained from it, of a metallic appearance, having the colour of silver, considerably heavier than water, fusible at a heat below redness, not volatile, inflammable, and reproducing barytes when combined with oxygen.

Strontites, the last of these earths, bears a close resemblance to barytes in many of its properties. Like it,

it has a pungent acrid taste, is soluble in water, crystallizable from its saturated solution, by cooling, changes the vegetable colours to a green, combines with the acids, and decomposes a number of the compounds which they form with the other alkalis and earths. Its native compounds too have a considerable specific gravity. It is, however, much less soluble in water than barytes; it requires nearly 200 parts of cold water to dissolve it, though boiling water dissolves it in much larger quantity. Barytes decomposes its salts. It is not poisonous, nor does it appear to exert any marked action on the living system. A characteristic property of it is that of its salts causing inflammable bodies to burn with a blood red flame.

Following the series from the metallic oxides through the earths, we arrive at the Alkalis. These possess the chemical property common to the whole, and most characteristic, that of combining with acids, neutralizing the acid properties, and forming compounds, analogous in general properties to those formed by the earths and metallic oxides with the acids. But they display still more energy in their chemical actions than the earths, and are more remote in their qualities, from the oxides of the common metals. Their taste is extremely harsh and acrid; they are highly caustic; abundantly soluble in water; exerting indeed such an attraction to it as to imbibe it from the atmosphere, or attract it from other bodies: they are fusible by a moderate heat, and by a stronger heat are volatilized; they change the vegetable blue and purple colours to a green, the yellow to a brown, and they combine with oils, rendering them diffusible or soluble in water. These properties belong to two of the alkalis which are naturally concrete, potash and soda. A third, ammonia, exists when uncombined as a permanent gas, but it is instantly condensed by water, and absorbed by it in large quantity, and the general properties of it not connected with its peculiar form are the same.

One of the most splendid discoveries of Modern Chemistry is that of the composition of the Alkalis. Am-

monia had been known to be formed from the combination of hydrogen with nitrogen, and analogy suggested to chemists the conclusion, that the two fixed alkalis are of similar constitution, containing either of these elements as a common principle; and thus led them aside from the analogy suggested by their connection with the metallic oxides in neutralizing the acid properties, from which it might have been inferred, that they and the earths are compounds of metals with oxygen. Mr. Davy, availing himself of the powerful instrument of chemical analysis which galvanism affords, submitted potash and soda to its action, and succeeded in effecting their decomposition. Their bases are substances extremely peculiar; they have the metallic lustre, opacity and tenacity, but not the property formerly considered as characteristic of metals, that of great specific gravity, as they are even lighter than water: they are very fusible and volatile, and pass through these changes of form, as well as different states of cohesion, in a very limited range of temperature; they are also highly inflammable; combined with oxygen, they form these alkalis; and if these bases are to be admitted as metallic, the analogy in chemical constitution is established between the alkalis, earths, and metallic oxides.

Potash; or as it ought to be named, (in conformity to the rule of giving a similar termination to the names of substances belonging to the same order,) Potassa, is obtained from the incineration of vegetables, especially from the wood; the saline matter remaining after the wood has been burnt, consists principally of this alkali, in combination with carbonic acid, being freed from the impurities by lixiviation; this acid is abstracted by the action of lime, the alkali is obtained in solution, and by evaporation, can be obtained in a solid state. It is of a white colour, crystallizable, fusible, and volatile at a higher heat; abundantly soluble in water, soluble also in alcohol, powerfully caustic, and possessed of all the alkaline properties in a high degree. There is some uncertainty, whether it exist in the vegetable matter from which it is procured in the state in which it

is obtained, or whether its base is a constituent principle of that matter, and is oxygenated during the combustion: one reason for admitting of the latter opinion, at least in part, is, that the alkali cannot be extracted in so large a quantity by any other process as by burning.

Potassium as the base of potash has been named, is at the temperature of 32° a solid substance, hard and brittle, of a white colour, opaque, and with the lustre of polished silver; at 50° it becomes soft and malleable; at 60° it is in the form of small globules, somewhat consistent; at 70° it becomes more mobile and liquid; and at 100, it is completely so. It requires a temperature near to a red heat to volatilize it. It is lighter than water, or even than alcohol or ether. It is highly inflammable, when heated to its vaporific point, burning with intense heat and vivid light; at lower temperatures it combines more slowly with oxygen; it passes through various states of oxidation to the maximum, when it forms the alkali, being then combined with oxygen in the proportion of 85 to 15. Such is the strength of its affinity to this principle, that it takes it rapidly from water, and from all the acids. It combines with the primary inflammables, and with the metals.

Soda, or mineral Alkali as it has been denominated, in contradistinction to the other alkali, which has been distinguished by the epithet of vegetable, exists as a constituent principle of several saline mineral substances, but it is usually extracted from the combustion of marine plants. It is afforded by the combustion combined with carbonic acid, and associated with various other saline substances, and is obtained pure by the same general process as that applied to potash. Whether it pre-exists in sea plants, or whether these, in common with land vegetables, afford potash in burning, which decomposes the muriate of soda with which they are impregnated from their situation, so as to afford soda, has not been well determined. In its physical properties this alkali bears a considerable resemblance to the other. It is solid and white, crystalliza-

ble, though with difficulty, from its watery solution; extremely acrid and caustic, fusible and volatile from heat, having a strong attraction to water, changing the vegetable colours to a green, and possessing all the alkaline properties. From potash it is principally distinguished by the very different compounds it forms.

Sodium, the base of soda, is white and opaque, and has the lustre and appearance of silver; is soft and malleable; is somewhat lighter than water; it is less fusible than potassium, not losing its cohesion at a lower temperature than 120°, and requiring for its perfect fusion a heat of 180; it is also less volatile. When heated to ignition, it burns vividly; at lower temperatures it absorbs oxygen without undergoing combustion; it abstracts oxygen from water and from the acids, frequently with inflammation. It appears to be susceptible of various degrees of oxidation; at the maximum when the proportion of oxygen is about 21 to 79, it forms soda. It acts on the inflammables and the metals nearly as potassium does.

Ammonia. This alkali has usually been denominated volatile, from its volatility compared with the others, even when it is combined with water, being considerable. In its insulated state it exists as a permanently elastic fluid; its odour is extremely pungent; water absorbs it in very large quantity, and this solution forms what is named Liquid Ammonia. Its volatility, or tendency to assume the elastic form, and its comparative dilution, lessen the energy of its action; and hence, though possessed of the general alkaline properties, it appears weaker than the others in the affinities it exerts. Its composition was supposed to have been established, nitrogen and hydrogen appearing, both from analytic and synthetic experiments, to be its constituent principles. When the composition of the fixed alkalis was discovered, and they were proved to be oxides, analogy evidently suggested the conjecture, that oxygen would probably also exist in ammonia; and Mr. Davy, from some experiments, concluded, that this is the case,

though these have not been fully confirmed by subsequent experiments. The analogy in the chemical constitution of ammonia to that of the fixed alkalis, has however been established by the important discovery, that it affords metallic matter; Berzelius and Pontin, Swedish chemists, having found, that when the alkali is placed at the negative wire in the galvanic circuit in contact with quicksilver, the quicksilver increases in bulk, becomes thick, and at length a soft solid,—changes perfectly similar to what are produced in it by the addition of metallic matter, and which can scarcely be conceived to arise from any other cause. The matter producing these effects in the experiment, must have been derived from decomposition of the ammonia; and it is accordingly found, that when this substance receives oxygen, either from the air or from water, ammonia is reproduced. Either hydrogen or nitrogen must therefore be of a metallic nature, combined probably with a portion of oxygen; and it is not improbable that both these gases may be modifications of the same base. The analogy in constitution has thus been rendered complete, with regard to the three alkalis, and they as well as the earths, are connected by a series with the oxides of what are more strictly denominated metals,—one of the most perfect examples of generalization which the science of chemistry affords.

The last important class of chemical agents is that of Acids. The characteristic acid properties are a sour taste, the power of changing the blue, purple, and green colours of vegetables to a red, and that of combining with the alkalis, earths, and metallic oxides, forming compounds, in which, when the combination is established in the due proportion, the properties of the acid, and of the base with which it is united, are equally neutralized. The more powerful acids have a considerable degree of causticity; they have a strong attraction to water, and they act with energy on inflammable and metallic substances.

All the acids are compounds of oxygen, and this element is therefore regarded as the principle of acidity. This truth was established by Lavoisier, with regard to a number of the acids, and extended by analogy to a few which had not been decomposed. It has been confirmed with regard to these, by more recent investigations. The bases of the acids are either inflammable or metallic. The production of acidity is usually the result of their full oxygenation, and in some cases the base combines with two proportions of oxygen, forming two acids, different in their properties from each other.

On these facts, with regard to the chemical constitution of the acids, their nomenclature is founded. The base being specific with regard to each acid, while the oxygen is common to them, it is from the name of the former, that the name of the acid is derived; and, by a variation in the termination of this name, the different acids which may be formed from the base, by a difference in the degree of oxygenation, are distinguished; the name terminating in the syllable *ic*, when the acid is that which contains the larger proportion of oxygen, and in the syllable *ous* when it contains the smaller proportion. Thus sulphur forms two acids, by combining with two proportions of oxygen; the term sulphur is the radical whence the names of these are derived, and according to the above principle, the one is denominated the sulphuric, the other the sulphurous acid. Where a large quantity of oxygen can be farther combined with an acid without increasing, but rather diminishing its acid powers, the name is expressed by prefixing the epithet *oxy*, as oxymuriatic acid.

Acids have an extensive power of combination. From the numerous affinities they exert, and from the facility with which they afford oxygen, they are the most active of any of the compound chemical agents, and are hence employed in many pharmaceutic operations. Those of most importance under this view are the sulphuric, nitric, and muriatic.

The Sulphuric Acid, formed from the full oxy-

genation of sulphur, exists combined with a small quantity of water in the form of a liquid of great density, and from this state of concentration acts powerfully; exerting strong attractions to other bodies, and though, from the strength of affinity between its principles, it does not directly afford oxygen with facility to many substances, it enables them to attract oxygen from water, and thus subjects them to chemical change. The SULPHUROUS ACID, which is formed from the same base in a lower degree of oxygenation, existing naturally in the elastic form, which is an obstacle to its entering into combination, and not being very largely absorbed by water, so as to form a concentrated solution, is much weaker.

NITRIC ACID is the result of the full oxygenation of nitrogen; and the oxygen, not being retained in the combination by a strong attraction, the acid yields it readily, and hence acts with more facility and energy on inflammable and metallic substances than any other acid,—oxidating the former, and first oxidating, then combining with the latter; hence in pharmacy it is used as the most general solvent of the metals. What is named NITROUS ACID, is the nitric with an impregnation of nitric oxide gas; it is of a yellow colour, and emits similar coloured dense fumes, while the other is colourless; the chemical agencies of both are nearly the same.

MURIATIC ACID exists when uncombined in the aërial form, but is absorbed in large quantity by water, and forms a liquid acid of considerable strength. Its analysis had not been effected, and even yet, by the action of potassium on it, there have been established only some singular facts, with regard to water combined with it, and the effect of this water on its acidity; the quantity of water in combination with the acid even in its elastic state, is supposed to amount to at least one third of its weight; and though the acid itself cannot be obtained free from this water, yet when combinations of it with other acids are procured in this state, the

acid powers are completely suspended, and are restored on the addition of a little water. This acid not directly affording oxygen to bodies, oxidates them only by enabling them to attract oxygen from the water it contains; it thus dissolves metals; and it farther combines with other substances, as the alkalis or earths. It is capable of uniting with an additional proportion of oxygen, forming what is named Oxymuriatic Acid, which, although its acid powers are weaker, imparts oxygen more readily to bodies. And, with a still larger proportion of oxygen, it forms a third acid, Hyperoxymuriatic Acid, which gives to the saline compounds in which it exists, the power of acting with much energy on inflammable bodies, in consequence of the very large quantity of oxygen condensed in the combination, and not retained by any great force.

Other acids less important as pharmaceutic agents, are the Carbonic, Phosphoric, Boracic, and Fluoric.

Carbonic Acid, the product of the complete oxygenation of carbon, existing in the elastic form, and being absorbed by water only in sparing quantity, has no very active chemical power, but is of importance from existing in many natural combinations, particularly of saline and earthy substances belonging to the Materia Medica. The characters eminently distinguishing it are its only weakening, not entirely neutralizing, the properties of the alkalis, when in combination with them, and its being disengaged rapidly with effervescence by other acids from these compounds, and from those its forms with the earths.

Phosphoric Acid has phosphorus for its base; and the affinity between this base and the oxygen, with which it is combined, being strong, it scarcely acts on bodies by oxygenating them, but simply by entering into combination with them; nor are these combinations comparatively of much importance. Phosphorous Acid, in which the proportion of oxygen is smaller, is still less important.

Boracic Acid exists in the concrete form, and its chemical action is comparatively weak. So powerful is the affinity between its base and oxygen, that it has only been decomposed by galvanism, or by potassium; and its decomposition, there is reason to conclude, is even not complete: a dark olive coloured substance is obtained, inflammable, and which by combining with oxygen, re-produces boracic acid; this substance being probably the real base in a lower degree of oxygenation.

Fluoric Acid is elastic, and is not very largely absorbed by water; its chemical action is from these circumstances, therefore, not powerful. It unites, however, easily with the alkalis and earths, and, what peculiarly distinguishes it, is capable of dissolving siliceous earth. It suffers partial decomposition from the action of potassium, oxygen being abstracted from it, and a chocolate coloured substance deposited which burns in oxygen, and re-produces the acid.

There is a series of acids with compound bases, derived from the vegetable and animal system; but those of them entitled to notice will be best considered with the classes of substances with which they are more strictly connected.

The acids combine with the alkalis, the earths, and the metallic oxides; and when the combination is established in the due proportion, the chemical properties of the acid, and of the base with which it is united, are mutually neutralized. Hence, these compounds are named Neutral Salts, and, as an order of chemical agents, they are distinguished by certain common properties. They can always be obtained in the solid state: they are generally, though not universally, soluble in water; those of them which are soluble, are capable of assuming a crystalline form, the form being very different in different salts. Those which chrystallize from their aqueous solution, always retain a quantity of water greater or less in combination, essential to the crystal, and therefore named their water of crystallization. When heated, the increase of temperature is

often sufficient to enable this water to dissolve the real saline matter: this is named the watery fusion of salts: as it evaporates, the salt becomes concrete, and, by a farther increase of heat, is either fused or decomposed. The term Neutral Salt is sometimes restricted to those of which the alkalis are the bases: those formed from the earths are named Earthy Salts; and those from the metallic oxides, Metallic Salts. The nomenclature of the whole series is in the modern chemical language, simple, and, at the same time, systematic and precise. They are formed into genera and species, according to the acids, and the bases of which they are composed; the name of the genus is derived from that of the acid, the name of the species from that of the base with which the acid is united. Thus, all the salts formed from sulphuric acid are considered as constituting one genus, and are named Sulphates; and the name of each species is expressed, by adding the name of the base, as Sulphate of Soda, Sulphate of Lime, Sulphate of Iron, &c. The acid which sulphur forms in a different degree of oxygenation, the Sulphurous, forms a different order of salts; these are named Sulphites; and in like manner we have Nitrates, and Nitrites; Phosphates, and Phosphites, &c. Those formed from oxymuriatic acid, are named Oxy-muriates. Salts are sometimes formed with an excess of acid, or with an excess of base: the acid being considered as the principle forming the genus, these are distinguished by prefixing to the usual name the epithet *super*, when the acid is predominant, and the epithet *sub* when it is deficient, or when the base is in excess, as Super-sulphate of Potash, Sub-carbonate of Soda, &c. When an acid is combined in one compound with two bases, as sometimes happens, the names of both bases enter into the name of the Salt, as Tartrate of Potash and Soda. Thus, by this simple system, a facility of nomenclature is afforded; the whole is uniform and systematic, and the memory is aided, by the name pointing out the nature of the salt; and the adoption of this nomenclature in Pharmacy, is an important improvement.

So far the chemical analysis of unorganized substances connected with the Materia Medica has been the subject of consideration. It remains to take notice of the analysis of those belonging to the vegetable and animal kingdoms,—a subject of much importance, particularly as it relates to the vegetable part of the Materia Medica, and which from this importance, as well as from the nature of the substances themselves, requires to be considered with more minute details.

These two classes of bodies are distinguished by very obvious chemical characters. In unorganized substances, the principles are few, and are combined generally in very simple states of union; their analysis can be executed with accuracy; even the proportions of their principles can be determined with precision, and they can be again combined so as to form the decomposed substance, thus confirming the analysis by synthesis. But, with regard to the products of organization while the composition so far as it relates to the ultimate elements, is more uniform, it is with regard to the modes in which they are united much more complicated. They consist of a few common principles; but these, presented to each other in the vessels of the organic being, have been placed under circumstances indefinitely varied, and which art can very imperfectly imitate. Combinations of the same elements are formed, therefore, greatly diversified, and properties are derived from differences of proportions, or modes of union extremely minute. Hence their accurate analysis is executed with difficulty,—a difficulty increased by the circumstance, that these elements having strong mutual affinities, cannot in general be obtained insulated, but when the compound has been decomposed enter into new combinations liable to be modified by slight variations of circumstances; the proportions therefore can seldom be determined with accuracy, the modes of union in general remain unknown, and the confirmation by synthesis is entirely precluded.

Another character distinguishes these two classes. The composition of unorganized bodies being more simple, is not so liable to be subverted; their constituent principles being few, their affinities operate with more force, and the combination is more permanent. That of organized bodies being more complicated, has characters precisely the reverse. Composed always of several elements, the affinities are more nicely adjusted, and are therefore more easily modified; and their principles having tendencies to enter into numerous forms of combination, slight variations of circumstances subvert the equilibrium. Hence the susceptibility of decomposition by which they are distinguished; they are liable even to spontaneous changes from the reaction of their elements, and when this is favoured by humidity, elevation of temperature, or the action of the air, new combinations are established, whence the original compounds are decomposed.

From the peculiar constitution of the products of organization, there are two kinds of analysis to which they are subject. The object of the one is to discover their ultimate composition; that of the other is less refined, being confined to the investigation of the proximate principles of which they are composed.

It is seldom that a vegetable substance is homogeneous. The seed, for example, the bark, or the leaves of a plant, is not of one uniform composition, but consists of various proximate principles in a state of mixture, or of slight combination, and capable of being easily separated from each other. Now these are often connected with their medicinal virtues; the virtue residing perhaps not in the entire substance of the leaf, bark, or seed, but in a principle capable of being separated, and which may frequently be employed in its insulated state. Hence the importance of the analysis of the vegetable substances belonging to the Materia Medica, so far as relates to their proximate principles; the knowledge it conveys enabling us to employ them with more discrimination, and to submit them to the proper

pharmaceutic treatment. An enumeration of their proximate principles, and more particularly of those on which their medicinal powers depend, accordingly always enters into their description as articles of the Materia Medica.

This analysis is executed in various modes, adapted to particular cases, according to the principles which form the vegetable substance.

An important principle is sometimes separated merely by heat. The temperature cannot indeed be elevated very high, as then the proximate principles of the vegetable would be themselves decomposed, and their elements brought into new combinations. But at a heat comparatively moderate, as that of boiling water, this does not happen; and at this temperature several of the principles of plants, such as their essential oil, camphors, and some others not very well defined, are volatilized without decomposition and of course can be obtained pure.

The action of different solvents is of more extensive use in conducting the vegetable analysis. Water dissolves several of their component principles, such as gum and extractive matter, tannin, saline substances, and some others. These are dissolved in greater or less quantity, and in more or less purity, according to the temperature of the water employed. In general, by raising the water to its boiling point, it is able to dissolve them more completely; but some of them are apt to be volatilized, and others altered in their composition, especially if the atmospheric air is not excluded. Of the substances which the water holds dissolved, part are separated as it cools; the gum can be precipitated by alcohol; the saline substances may be crystallized, or can be discovered by evaporating the solution to dryness, and exposing the mass to such a heat as will destroy the inflammable parts, and tannin is detected by its chemical tests.

Alcohol is another agent of much importance in executing the vegetable analysis. It dissolves the resin,

balsam, camphor, and essential oil: these solutions are decomposed by water, each substance being separated, and discernible by its peculiar qualities. Equal parts of alcohol and water, or proof spirit as it is named, is also often employed as a solvent in the analysis of vegetables. Ether dissolves nearly the same principles as alcohol. And the acids, alkalis, and soluble earths, are sometimes of utility as re-agents, in pointing out the existence of peculiar principles.

Lastly, in the analysis of vegetables, we are often able to procure several of their proximate principles, by mechanical means, particularly by expression. Sometimes, too, they exude spontaneously from the growing vegetable, or are obtained by it from incisions made in the branches or trunk.

After we have discovered the proximate principles of vegetables, the next step is to ascertain their composition. This is an investigation attended, however, with much difficulty as being liable to all the deceptions arising from a complicated analysis, and incapable of being confirmed by the surer test which synthesis affords.

The composition of these substances with respect to their ultimate principles is nearly uniform. All of them contain carbon and hydrogen, generally if not invariably united with oxygen: some farther contain nitrogen and phosphorus; and in others several of the metals, particularly iron and manganese, exist. Lime, too, and the two fixed alkalis, either pure or more commonly in combination with some of the acids, are not unfrequently constituents of vegetable matter. These latter substances, however, are seldom in any considerable proportion; nor in general do they appear to modify much the properties of the substances in which they exist. Nitrogen, and perhaps lime when present, appear to have the most important influence, and with the exception of the few compounds of which they form a principle part, it may be said, that the vegetable proximate principles consist of carbon, hydrogen, and oxygen; the differences in their properties being produced

by differences in the proportions of these principles, and of the modes in which they are combined.

That a difference in the proportions of these elements may give rise to the differences in the properties of the compounds which they form, cannot be doubted; since in many other cases of chemical combinations, where there is no difficulty in the analysis, differences equally important and well marked are produced by this cause. In vegetable substances we accordingly can often trace this as the cause without being able to point out any other. Thus fixed and volatile oils have properties in many respects dissimilar; by analysis both are found to consist of carbon and hydrogen, united only in different proportions, the volatile oils having more hydrogen in proportion to the carbon than the fixed have: this is a cause sufficient to account for the difference in their properties; and it accords sufficiently with that difference, for hydrogen being a substance extremely rare and volatile, those compounds in which it predominates, as ether, alcohol, and others, are in general light and volatile. The greater volatility, therefore, of the essential, compared with the fixed oils, may be ascribed to its predominance.

In other cases, it is probable that the mode in which the constituent principles of these substances are united, is the cause of the difference in their qualities. This is indeed a cause which can be but imperfectly investigated, either by analysis or synthesis; but it is conceivable *a priori*, and sufficiently confirmed by chemical facts, that a difference in the mode of union may give rise to very important diversities of properties. If a compound, for example, consist of three elements, these may be united in two modes. Their attractions may be reciprocally balanced, and they may form what is named, in strict propriety, a ternary combination; or, from a variation in the circumstances under which the union has been effected, two of them may be combined, and the compound thus formed may exert an attraction to the third principle, unite with it, and form a new sub-

stance. The compounds resulting from these different modes of combination, though composed of the same principles, united perhaps even in the same proportions, would still have properties different from each other. Still greater diversities will be produced where the elements are more numerous, and the possible modes of union of course more diversified. And when we consider these causes from difference of proportions, and modes of combination, we shall scarcely be surprised at the number of different substances, immense as it is, which nature forms from a few elementary principles.

The proximate principles of vegetables are sometimes analyzed by exposure to heat: their elements enter into new combinations, and from the nature of the products, we discover what the principles were. Thus if the substance exposed to heat yields a large quantity of acid, we conclude that it contains a considerable quantity of oxygen as a constituent part. If it affords much empyreumatic oil, we infer that it contains a large proportion of hydrogen, this principle being necessary to the constitution of that product. When ammonia or prussic acid is afforded by this kind of analysis, we conclude, for the same reason, that nitrogen has been a constituent principle. And by the same mode are discovered the earths and metals which had been present in it; these remaining after the volatile parts had been expelled. Lastly, by the quantity of charcoal which remains as a residuum, we can form some conclusion as to the quantity of carbon which the vegetable substance contained.

Their analysis is also effected by exposing them to heat with the access of atmospheric air, and collecting the products of the combustion that takes place. From the nature of these products, we can ascertain the proportions in which they were united. Oil, for example, when subjected to this analysis, yields nothing but carbonic acid and water. We conclude therefore that it is composed of carbon and hydrogen, since these principles, united with oxygen, form these products, and since, if any other simple substance had existed in the

oil, it would have appeared either pure or in combination with oxygen. We can even determine in this manner the proportion in which the carbon and hydrogen existed in the combination. From knowing what quantity of carbon exists in a given quantity of carbonic acid, and what quantity of hydrogen exists in a given quantity of water, we thus also discover whether any oxygen had existed in the composition of the oil.

They are sometimes analysed by subjecting them to spontaneous decomposition. It is thus that sugar is brought into the state of fermentation; and from the products of the fermentation the principles of the saccharine matter are determined.

Lastly, their analysis is sometimes executed by the agency of the nitric acid, which communicates to them oxygen, and by the product ascertains the nature of their acidifiable base.

Such are the methods by which these principles of vegetable matter are analysed. It is to be remarked, that the analysis is so difficult, as to afford, even when executed with the greatest care, only approximations, and as applied to the articles of the Materia Medica is seldom of utility, since we can scarcely ever discover any relation between the ultimate composition and the medicinal powers of the substance analysed. These, in common with all its properties, no doubt depend on that composition; but our modes of analysis are still too limited and imperfect to admit of our tracing the connection between them. The application of chemistry, therefore, to the vegetable substances belonging to the Materia Medica, is, as has already been remarked, in a great measure confined to the discrimination of their proximate principles.

The proximate principles of vegetables are numerous, and of very different kinds. They are not at all to be met with in every vegetable, or in every period of vegetation: some exist only in certain plants, and that only in their state of vigour and maturity: at other times they are to be found only before they have arrived at that

period; some are deposited in particular organs, others are diffused through the whole substance of the vegetable, and mixed in a manner more or less intimate with all its parts; and some are nearly peculiar to certain vegetables, while others are common to almost every plant. Those only require to be pointed out in this sketch, which are particularly connected with medicinal properties.

These principles are the products of vegetation from a common juice or sap, which circulates freely through every part of the vegetable system, being supplied by absorption from the soil, and perhaps from the atmosphere. It varies in its qualities, particularly according to the season, and the progress of the plant to maturity; frequently too it has an intermixture of the proper juices: it always contains the usual elements of vegetable matter, with generally saline substances, having principally lime for their base. By the chemical changes it suffers from the actions of the vessels of the plant, aided by the action of the air and of light, its elements pass into various states of combinations, whence the peculiar products of vegetation are formed.

The first transition of the sap appears to be into Mucilage, or Gum, one of the proximate principles contained in greatest abundance in vegetables. It is found in all young plants, in greater or less quantity; and is often so abundant in the plant, as to be discharged by spontaneous exudation. It abounds also in their roots, stalks and leaves, and especially in their seeds. It is an inodorous, insipid, and glutinous substance, soluble in water, in every proportion, and forming with it a thick viscid solution, which by evaporation affords a tenacious mass, that when dried is brittle and again soluble. It is insoluble in alkohol, ether, or oil, and is precipitated from its solution in water by the addition of alcohol. It does not absorb oxygen from the atmosphere; though its solution becomes sensibly acid by keeping, owing to partial spontaneous decomposition, and the combination of part of the principles of the gum, so as

to form acetic acid. Exposed to heat, it is neither fusible nor volatile. At a temperature superiour to 212, but inferior to that of ignition, it is decomposed; its principles entering into new combinations: the products are an acid liquor consisting principally of acetic acid, carbonic acid and carburetted hydrogen gases, with a little ammonia, and a residuum of charcoal containing lime, one ounce of gum affording 6 grains of lime. This lime is also detected by adding sulphuric acid, to a solution of gum. From these products of the analysis, it is evident that the ultimate principles of gum are, oxygen, hydrogen, and carbon, with smaller proportions of nitrogen and lime. Gum is not capable of passing into the vinous fermentation, which appears to be owing to the portion of lime existing in it, as lime has the effect of preventing even sugar from suffering this change.

Gum is not inflamable; for although, when heated, in contact with atmospheric air, it combines with oxygen, it emits no flame. The principal products of this combination are carbonic acid and water. By the action of nitric acid it is converted into oxalic, malic, and saccholastic acids. Oxymuriatic acid converts it into citric acid.

Gum is usually obtained either by spontaneous exudation, or by incisions made in the trunks and branches of trees. It is more or less pure as it is obtained from different plants. Its existence in vegetables is detected by boiling gently the vegetable substance with water: the water dissolves the gum, and if much of that principle be present, the solution is glutinous. It may be allowed to remain till the impurities have subsided; then be evaporated to the consistence of thin syrup; and the addition of 3 parts of alcohol will separate the whole of the gum in flakes.

Pure gum is not an active substance, considered with respect to its effects on the living system. In medicine it is only used for its lubricating quality; and so little activity does it exert, that it has often been taken for a considerable time as an article of food. From its che-

mical properties it is of rather more importance. As a component part of vegetable matter, it renders the other parts more soluble in watery liquors, and may thus favour their action on the stomach. In Pharmacy it is used as a medium to combine balsams, resins, and oils with water. If a small quantity of any of these substances be triturated with a little gum or mucilage, on the addition of water they remain suspended in it, forming a white milky like mixture, retaining all the properties of the balsam or oil. Though pure gum is thus inactive, yet the virtues of many vegetables depend on a gummy matter.

Fecula is a principle approaching in several of its characters to gum. Like it, it is soluble in hot water, and forms a viscid glutinous solution; but it is at once distinguished by being perfectly insoluble in cold water. It exists principally in the turberose roots and gramineous seeds. It is extracted by beating the dried root or seed with a large quantity of water; the liquid soon becomes milky, from the diffusion of a white powder through it. On being poured from the remaining vegetable matter, and allowed to remain at rest, this powder is deposited, and when washed and dried is the fecula of the plant. It is generally mild and insipid, of a white colour, with a peculiar kind of brilliancy, soft to the touch; but portions of the other principles of the plant sometimes adhere to it, from which it receives colour, smell, and taste. Starch is the fecula of wheat, and is the most abundant part of that grain.

Fecula is insoluble in alkohol. The action of the acids on it is somewhat analogous to that they exert on gum, dissolving it when they are weak or diluted, but decomposing it when they are more concentrated. The alkalis also dissolve it. Exposed to heat, it is charred, and suffers decomposition, affording products which indicate carbon, hydrogen, and oxygen to be its constituent principles. A property eminently characteristic of it and probably depending on its composition, is that of being convertible into saccharine matter, and thence

ultimately passing into the vinous fermentation,—a property not belonging to gum or any other principle. This conversion takes place in germination, and is accompanied with an absorption of oxygen, and formation of carbonic acid.

Fecula is a substance highly nutritive, and is usually contained in those plants which serve as food. It is sometimes employed in its pure state in medicine, on account of its nutritive quality, and from its being easy of digestion: sago and salop are substances of this kind.

Gluten. This principle is usually associated with fecula, and is obtained in the process in which the fecula is separated. It then appears as a viscous, elastic, and fibrous like substance, which from its close resemblance to the animal product named Gluten, has been denominated Vegetable Gluten. It is obtained from the flour of wheat in greatest abundance: the flour is made into a paste with water, which being compressed by the hand, while a stream of water falls upon it, the fecula is carried off in the state of powder: the mucilaginous and saccharine parts of the grain are dissolved by the water; and there remains a tenacious ductile mass, forming the gluten: it has scarcely any taste, is of a grayish colour, and when dried is semi-transparent, resembling glue in its appearance: it is insoluble in water, and is dissolved in very small quantity by alcohol: by the action of nitrous acid, it is converted into oxalic acid, giving out, at the same time, nitrogen gas; decomposed by heat it affords a large quantity of ammonia, and it is subject like animal matter to putrefaction. It contains a larger proportion of nitrogen than any other vegetable product does, and it is supposed to render those vegetables in which it is present highly nutritive.

Another principle occasionally found in vegetables, but belonging more exclusively to animal substances, is that which has been named Albumen, from its resemblance to the animal principle of that name. It is soluble in cold water, its solution being coagulated by heat:

it is coagulated also by alcohol, but it is dissolved by the alkalis: like gluten it is liable to putrefaction, and furnishes a large quantity of ammonia by distillation. This principle is found in hemlock, scurvy grass, cresses, and several other plants, and is obtained from the fresh expressed juice of the leaves when they are heated nearly to the boiling point; the albuminous matter coagulating, and separating in the form of flakes. A similar separation takes place on the addition of spirit of wine. It is contained also in the seeds of other plants, particularly in the different nutritive grains; in the farina of wheat, for instance, it is found dissolved in the water which is employed in separating the fecula from the gluten. This principle, it may be added, has been regarded, and perhaps justly, as a variety of gluten; it differs little from it in chemical properties; and the peculiar physical qualities supposed to be distinctive of gluten are obviously derived from the process by which it is obtained.

Saccharine Matter. This exists in many vegetable substances, especially in their fruits and roots, but often intimately united with their mucilaginous and extractive matter. When freed from these, its taste is sweet, without any peculiar flavour; it is soluble in water and in alcohol; is capable of crystallizing; its watery solution enters first into the vinous, and then into the acetous fermentation. By the action of nitric acid, it is converted into oxalic acid; by decomposition by heat, it affords a large quantity of empyreumatic acetic acid, a small quantity of empyreumatic oil, carbonic acid and carburetted hydrogen gases, the residuum being charcoal. It consists, therefore, of carbon, hydrogen, and oxygen; and from the large quantity of acid which its analysis yields, it appears to contain more oxygen than any other vegetable substance that is not acid.

Sugar appears to be formed from the fecula of the vegetable in which it exists. It contains nearly the same principles as it does, and the operation of malting throws considerable light on its formation; in this process, the

fecula of grain is converted into saccharine matter, oxygen is absorbed, and carbonic acid formed; and this abstraction of carbon, if it constitutes the whole change, of course proves that the sugar, which is the product of the operation, has an increased proportion of hydrogen and oxygen. Sacharine matter has little activity, though there are some varieties of it, in which some weak medicinal powers reside.

Oil is a common proximate principle of vegetable matter; it is of two kinds, expressed or fat oil, and distilled, volatile, or essential oil. These have the common qualities of unctuosity and inflammability; but they also possess peculiar properties, by which they are distinguished as distinct species.

The expressed, fat, or fixed oils, are thick and unctuous, insipid and indorous; they congeal on exposure to cold, are lighter than water, and insoluble in that liquid; they are likewise insoluble, except in very minute quantity, in alcohol, and they combine with the alkalis, forming soap. They are not volatilized at the temperature of 212: some require to be raised to 600 to make them boil, and the condensed oil is changed in its properties. At a temperature somewhat higher, they are decomposed in close vessels, and burn when the atmospheric air is not excluded. They also slowly absorb oxygen at a low temperature; a small quantity of an acid is formed, which renders them rancid; by longer exposure to the air, they are inspissated, and even become at length concrete. Those oils in particular which have been expressed with the aid of heat, and which are named drying oils, suffer this last change, and are ultimately converted into a resinous matter.

Expressed oils consist chiefly of carbon and hydrogen, as is established by the products of their decomposition by heat, which are chiefly carburetted hydrogen and carbonic acid. The products of their combustion are water and carbonic acid.

These oils are generally contained in the seeds and fruit of vegetables, and only at the period of their matu-

rity. They are extracted by expression, or by decoction with water; they are frequently impregnated with part of the extractive, mucilaginous, or resinous particles, which the seed or fruit contains; from which they derive colour, and in many cases peculiar taste and odour, and even perhaps certain medicinal powers. In general, however, they have little activity as medicines. They are mild and emollient, and are used principally for these virtues. They are rendered miscible with water by the medium of gum or sugar, or by the addition of a small quantity of any of the alkalis.

Volatile or essential oils have characteristic properties different from those of the expressed oils. They are volatile at a low temperature, and are entirely and quickly converted into vapour at the heat of boiling water, without being decomposed; they are soluble in a small proportion in water, and hence the impregnation which water receives from many vegetables by distillation. In alcohol, they are completely soluble; but they do not combine with the alkalis with facility; they are in general odoriferous, pungent, and even acrid; they are more highly inflammable than the fixed oils, and by exposure to the atmosphere they slowly absorb oxygen, are thickened and coloured more deeply, lose much of their smell and pungency, and are at length converted into substances of a resinous nature. This change is partly owing to the escape of part of the oil, but principally to the oxygen absorbed combining with part of their hydrogen.

These oils, from their analysis by heat, or by combination, appear to consist principally of carbon and hydrogen. They differ from the fixed oils in containing a larger proportion of hydrogen; hence they are more volatile, and more inflammable, and during their combustion they afford a larger quantity of aqueous vapour.

Volatile oils are less abundant in the products of vegetation than some other principles; they do not exist indeed in any considerable quantity but in the aromatic plants: in some plants, the oil is confined to the flowers, fruit, leaves, or bark; sometimes it is contained in several

of these parts, and in a few instances it is found diffused through every part of the plant. The quantity varies not only according to the age, but also according to the vigour of the plant; hence it is much influenced by climate, soil, and season. It is remarkable, that some of the most odoriferous flowers, as the rose or jessamine, yield scarcely any essential oil, though they lose their flavour by a gentle heat.

Some of these oils, being contained in distinct vesicles, may be obtained by simple pressure. In this manner, essential oils can be obtained from orange or lemon rind. More usually, they are procured by distillation; the vegetable is boiled in water; the essential oil is volatilized with the aqueous vapour; both are condensed in close vessels; the water has the taste and flavour of the plant, from having dissolved a small part of the oil: the greater part of it, however, is collected pure, either swimming on the surface of the water, when the oil is lighter, as is generally the case, or, in a few cases, when it is heavier, having fallen to the bottom.

The essential oils of vegetables may be considered as medicines of some activity. They have always the odour, and generally the taste of the vegetable from which they are obtained, accompanied with more or less pungency. Some of them, however, are less pungent and less acrid than the vegetable matter from which they are procured, these qualities residing in the resin, or some of the other proximate principles.

A proximate principle, found in some vegetables, similar in many of its properties to essential oil, is Camphor. It is a solid substance of a white colour, semi-transparent, having a strong peculiar smell, and a penetrating taste; tenacious, and slightly unctuous to the touch. It is very sparingly soluble in water, but is completely soluble in alcohol, ether, and oils; from these solutions, it is precipitated by the addition of water. It evaporates entirely, though slowly, at the common temperature of the atmosphere; at a higher temperature, in close vessels, it is sublimed without

alteration: it is also highly inflammable, the product of the combustion being carbonic acid, and a quantity of what is named camphoric acid. It is acted on by the more powerful acids, sulphuric acid charring it and forming a portion of tannin; nitric acid dissolving it, and decomposing a portion of it, converting it into an acid; muriatic, fluoric, acetic and carbonic acid dissolving it, without materially changing its composition, as the greater part can be precipitated by water. Nitric acid, repeatedly distilled from it, converts it into a concrete acid, named camphoric acid, which appears to be different from any known acid.

By particular management, camphor may be decomposed by heat. If it is intimately mixed, with six parts of clay, and made into small balls, by the addition of water, its volatilization is prevented, and, by the heat which may be applied to it, its decomposition is effected. A volatile oil, fragrant and pungent, of a golden yellow colour, amounting to one third of the weight of the camphor, distils over; a quantity of charcoal, about one fourth of the weight of the camphor, remains; the remaining products of the decomposition are, carburetted hydrogen, carbonic acid gas, and camphoric acid. From the result of this analysis, camphor appears to differ from the essential oils, principally in containing a much larger proportion of carbon, since, by its decomposition by heat, it is resolved principally into charcoal, or compounds of carbon, and into an oil, which has all the properties of an essential oil, being odorous and pungent, volatile and inflammable, soluble in alcohol, and precipitated from it by the addition of water.

Camphor is found in distinct vesicles, in the wood and bark of certain vegetables. It is also contained in many essential oils, as those of lavender, sage, and others, from which it is deposited on long keeping. The curious fact has been established, that it may be artificially formed, this formation of it taking place in the action of muriatic acid on oil of turpentine.

The same relation which camphor bears to the vola-

tile, wax seems to have to the fixed oils. This substance, though formed perhaps by the bee, is also a product of vegetation; it is yielded by the leaves and fruit, and it is sometimes intimately mixed with the resin, gum, or extractive matter of plants. It is insoluble in water, and is soluble in very small quantity with the aid of heat in alcohol. It combines with the fixed alkalis, though with some difficulty. It unites easily with the expressed oils. It melts at a moderate heat. By distillation in close vessels it affords an acid, and a considerable quantity of thick oil, a small quantity of charcoal being the residuum.

Resin. This principle is in some measure connected with essential oil, and in plants is often united with it, as well as with other principles. Some vegetables, however, exude juices which concrete into a matter entirely resinous, and it is from these that the characters of the substances belonging to this genius are taken. The distinguishing properties of a resin are its existing in a solid state, being insoluble in water, but soluble in alcohol, ether, and oils; the solution in ether or alcohol is decomposed by water; resins are in general odorous and sapid, though neither of these qualities is essential to a pure resin; they are inflammable, and burn with much smoke; at a temperature nearly that of boiling water they melt; but they cannot be volatilized without being decomposed. In close vessels the products of their decomposition by heat, are water, empyreumatic acetic acid, an empyreumatic oil and a residuum of charcoal, indicating carbon, hydrogen, and oxygen, to be their ultimate principles. At the common temperature of the atmosphere, they do not combine with oxygen; neither are they acted on by water; the solutions of them in alcohol are therefore employed under the form of varnishes, to preserve other bodies from alteration by exposure to the air. They are dissolved by the fixed alkalis, likewise by some of the acids, especially the acetic: the stronger acids decompose them.

The existence of resin in a vegetable is discovered by

infusing it in alcohol: this dissolves the resin if any is present, and it can then be precipitated from the solution by the addition of water. The method of estimating the quantity of resin in any vegetable, is by ascertaining the increase of weight which alcohol acquires from it by digestion, or the alcohol may be evaporated by a moderate heat, and the resin obtained pure.

Resins are in general more active than gums, with respect to their medicinal powers. The purest resins are indeed nearly inert, but there are many vegetable substances which act powerfully on the system, that appear to consist principally of resinous matter, and it is in this resinous part that their powers reside. The proper solvent or menstruum of resin is alcohol; by this it can be extracted from some of the other constituent parts of vegetables, though there are others which are soluble in the same fluid, and therefore it is difficult to obtain the resin pure. Though resin is insoluble by itself in water, yet part of it can be taken up, and kept suspended by the medium of gum. These two principles are often naturally mixed in vegetables, forming what are named Gum-resins, and some of the most active articles of the Materia Medica are natural compositions of this kind. Their properties are derived from the two principles of which they consist: thus, they are only partially soluble either in water or in alcohol; they are soluble in alkaline liquors; they are not fusible by heat, they only soften, and if the heat is raised higher are decomposed, affording a little ammonia with the usual products, probably derived from the gum they contain. The proportions of gum and resin, thus mixed, are in different substances of this family very various; but they are generally such, that a mixture of equal parts of water and alcohol dissolves the gum-resin. This is their proper solvent; it also dissolves some other vegetable principles, particularly extract, and hence it is the menstruum most generally used in Pharmacy to extract the active matter of vegetables.

Balsams are resinous juices, with an intermixture generally of essential oil, and containing always a portion of the acid named Benzoic Acid. They are usually thick and tenacious, becoming by age concrete. They are odorous and pungent, principally from the essential oil they contain.

A principle of considerable importance in its pharmaceutic relations, is what has been named by the French Chemists, by whom its characters were first established, Extract, or Extractive Matter, and which is supposed to constitute the active matter of many vegetables. Its leading character is that it is soluble equally in pure water and in alcohol; and hence a solution of it in the one fluid is not precipitated by the addition of another. By this property it is distinguished both from gum and resin, the one being insoluble in water, the other in alcohol. The compound of the two, or gum-resin, is indeed partly soluble in either of these fluids, but it never is completely so, since if it contain as much gum as renders it soluble in water, it is only partially dissolved by alcohol; and if it consist principally of resin, so as to be completely dissolved by alcohol, it is imperfectly dissolved by water. If a gum-resin be digested with alcohol, the tincture it affords is decomposed by water, and, *vice versa*, its watery solution is decomposed by alcohol.

There is another character by which extractive matter is distinguished, that of suffering decomposition when exposed in a humid state to the atmospheric air; this takes place even at natural temperatures, and with still more rapidity when the temperature is raised, as when the extractive matter is boiled in water: it then becomes insoluble and comparatively inert. This change, Fourcroy ascribed to the fixation of oxygen. According to T. Saussure, oxygen is indeed absorbed, but carbonic acid is at the same time formed; he supposes, too, that part of the oxygen and hydrogen of the extractive matter combine and form water, and that the inert insoluble precipitate has therefore an increased proportion of

carbon. It is from this cause apparently that the medicinal powers of many vegetables are injured by decoction in water with the admission of air, and not, as was at one time believed, from the dissipation of any volatile active principles; many plants indeed which sustain injury from this operation, containing no such principles.

By oxymuriatic acid, extract is converted into a concrete substance of a yellow colour, insoluble in water, probably from a similar change. It exerts affinities to argil and to metallic oxides. By heat it is decomposed, affording empyreumatic oil and acid, with a portion of ammonia; and in this, as well as in its spontaneous decomposition, when the re-action of its elements is favoured by humidity, it leaves as a residuum carbonates of potash and lime.

This principle is supposed to be the base of what are named the Extracts of Plants; preparations formed by boiling vegetables in water, and evaporating the clear liquor to a thick consistence. As procured in this way, it must generally have an intermixture, greater or less, of those principles, which are soluble in water; and from being so liable to decomposition, it must be injured during the evaporation. It is the basis, too, though in a similar state of intermixture and partial decomposition, of what are named the inspissated juices of plants. It exists also in the seeds, leaves, bark, and wood.

Though the characters of this principle appear to be distinctive, there is still some ambiguity with regard to it, particularly from the circumstance, that these characters are not uniform; a principle existing in some vegetables which has some of these distinctive properties without the others; as, for example, in Peruvian bark, the active matter of which is rendered inert and insoluble by decoction in water; and so far has one of the peculiar properties of extract; while it has not the other, that of equal solubility in alcohol and water, but is more soluble in the former than in the latter. Nor is there any certainty that this extractive matter has been obtained pure and insulated; and it is therefore pos-

sible that it may consist of some of the other principles in a state of mixture, their properties being modified by their reciprocal action.

Tannin. The important medicinal property of astrigency, appeared from some chemical facts to be dependent in vegetable substances on a peculiar principle, as it is discoverable in them by a chemical test; that of striking a deep purple colour with the salts of iron. This effect is exhibited by all the powerful vegetable astringents, and in a degree nearly proportional to their astringency. A peculiar acid having been discovered to exist in these astringents, afterwards named Gallic Acid, it was supposed to be the principle on which this property depends. But subsequent experiments have proved, that it resides in a principle of a different nature, which being the agent chiefly concerned in the operation of tanning, has received the name of Tan or Tannin.

This principle exists in all the powerful vegetable astringents; it is extracted by maceration with water, and is detected in the infusion by a peculiar test, that of the animal principle denominated Gelatin. If a solution of gelatin is added to the infusion, it becomes turbid, and a precipitate is thrown down composed of the tannin and gelatin in combination. We have no very perfect process for obtaining tannin in an insulated state; but the most simple is precipitating it from the infusion of a vegetable astringent by lime water, and afterwards submitting the compound of lime and tannin which is formed, to the action of dilute muriatic acid, which abstracts the lime, and leaves the tannin.

Tannin evaporated from its solution is loose and friable, having a resinous fracture, of a brown colour, a peculiar odour, and a taste rough and bitter. It is soluble in water, either cold or warm, and in alcohol not very highly rectified. It appears to suffer decomposition from exposure to the air in a humid state. By the acids, it is precipitated from its watery solution, and by some of them is decomposed. It unites with the alkalis, form-

ing soluble compounds; with the earths it forms compounds of sparing solubility; it exerts affinities to the metallic oxides, and it is principally from its action that infusions of vegetable astringents produce dark coloured precipitates with metallic salts. Exposed to heat, it affords an acid liquid, an oil, and a considerable quantity of carbonic acid, leaving a spongy charcoal.

Its action on animal gelatin is its most important property in relation to the object of the present outline, as on this probably depends its astringent power; it combines with it, forming an insoluble precipitate, whence it corrugates and renders more dense the animal fibre of which gelatin constitutes a principle part. It exists in all the powerful vegetable astringents, mixed with extractive matter, mucilage gallic acid, and other principles. It has also been established, that it is capable of being artificially formed, principally by the action of sulphuric and nitric acids on vegetable products which abound in carbonaceous matter.

Vegetable Acids. The acid found in the juices and other parts of plants, is not always the same. Not less than seven acids, different from each other, are of vegetable origin,—the Gallic, Oxalic, Malic, Citric, Tartaric, Benzoic, and Acetic. To these may be added the Prussic, though this is more peculiarly formed from animal matter.

Gallic Acid. The existence of this acid in some of the more powerful astringents, particularly in the gall nut, can be discovered by their watery infusion reddening the infusion of litmus. If the concentrated infusion be left exposed to the air for some months, this acid is deposited in the state of a crystalline deposite, mixed with mucous flakes, from which it may be purified. It may also be obtained by sublimation from the gall nut, or even by distillation with water, though it is doubtful whether, as procured, by these or other processes, it is altogether free from tannin; that by sublimation appears to be more so. By cristallization it is obtained in slender prisms of a white colour; its taste is

sour, and it reddens the vegetable colours; it is soluble in 24 parts of cold, and in less than 2 parts of boiling water; it is also soluble in alcohol. It suffers decomposition from heat, and the process indicates a large quantity of carbon in its composition. It combines with the alkalis and earths, and also with the metallic oxides, forming with the latter in general coloured precipitates; it is doubtful, however, whether these colours are not in a great measure derived from the tannin adhering to it.

Gallic acid was at one time supposed to be the principle of astringency, from being contained in the vegetable astringents, and giving a dark colour with the salts, of iron, the chemical test by which astringency appears to be indicated. It is doubtful, however, as has just been remarked, whether this latter property does not arise from the presence of tannin; the colour it does produce is less deep too, than that which the infusion itself strikes; and the acid in its insulated state has no astringency. Tannin is much rather to be considered as the astringent principle, and it exists accordingly in some of the more powerful vegetable astringents, as in catechu or kino, with scarcely any trace of gallic acid.

Malic Acid is contained in the juice of unripe apples and other fruits; it is uncrystallizable, forming when evaporated merely a thick liquor, which, if the heat be continued, becomes charred. By this and by the properties of the salts which it forms, it is principally distinguished from the other vegetable acids. By nitric acid it is converted into oxalic acid.

Citric Acid often accompanies the malic acid in the juices of unripe fruits, and it exists in a purer form in the juice of the lemon and lime from which it is extracted; the mucilaginous matter of the juice being separated by alcohol. It crystallizes in rhomboidal prisms; which, when it is pure are colourless; its taste is extremely sour; it is abundantly soluble in water; its solution undergoes spontaneous decomposition, but the crystallized salt can be preserved without injury. The more powerful acids decompose it, converting it principally into acetic acid.

Oxalic Acid exists in the juice of the sorrel (oxalis acetosella) and some other plants, combined with a portion of potash, not sufficient to neutralize it. It can also be artificially formed by subjecting fecula, gum, or sugar to the action of nitric acid. It crystallizes in slender prisms of a white colour; its taste is extremely sour; it is soluble in twice its weight of cold water, and an equal weight of boiling water; it is also soluble in alcohol. It is decomposed by the more powerful acids: in its decomposition by heat, it affords little empyreumatic oil; hence it appears to contain a small proportion of hydrogen; and as some of the other vegetable acids are converted into it by the action of nitric acid, there is probably a large proportion of oxygen in its composition.—The test by which it is peculiarly distinguished, is the insoluble precipitate it forms with lime, which it attracts from all the other acids.

Tartaric Acid. This acid, as it exists in vegetables, is usually combined with potash, in such a proportion, however, as to leave an excess of acid in the combination. This forms the super-tartrate of potash which is contained in a number of vegetable fruits. It is deposited from the juice of the grape in its conversion into wine, or in the slow fermentation which the wine suffers when kept. The acid procured from this salt is in tabular crystals, transparent; they are very soluble in water, the solution when concentrated being of an oily consistence. It is decomposed by heat, affording a large quantity of liquid acid little changed, with much carbonic acid gas. By nitric acid repeatedly distilled from it, it is converted into oxalic acid. This acid is an important one in pharmacy, from the numerous combinations of it applied to medicinal use.

Benzoic Acid is obtained from the vegetable balsams, generally by the process of sublimation. It condenses in slender crystals, white and brilliant. It is volatile, as this mode of preparation shows; its vapour is also inflammable; it is very sparingly soluble in cold water, but abundantly in hot water; the solution on cool-

ing depositing nearly the whole of the acid in prismatic crystals: it is also soluble in alcohol, from which it is precipitated by cold water; it is pungent, but not very acid to the taste; in its usual state its smell is fragrant, especially when it is heated: but this odour has been supposed to arise from a minute portion of the oil of the balsam adhering to it; as by repeated combinations with an alkaline base, and precipitation by an acid, it is obtained at length inodorous. It is not easily decomposed by the action of the more powerful acids. Decomposed by heat, it affords a larger quantity of empyreumatic oil than any other vegetable acid, whence hydrogen is supposed to predominate in its composition.

Acetic Acid. This acid has been considered as more exclusively the product of fermentation; it exists likewise, however, ready formed in the sap of the vine, and, combined with alkalis and earths, very generally indeed in the sap of plants. In its pure and concentrated state, in which state it can be procured only by artificial processes, it is a very powerful acid, highly pungent and fragrant, volatile and inflammable, and is distinguished by the peculiar action it exerts on some of the other proximate principles of plants,—essential oil, resin, gum-resin, camphor, gluten, and caoutchouc, which it dissolves without decomposing. Hence, even in its diluted state, under the form of distilled vinegar, it is sometimes used as a solvent in pharmaceutic processes; though it is seldom that it can be employed to advantage, as it is liable to modify the powers of the substances it dissolves.

Prussic Acid. The substance to which this name is given, is formed from some varieties of animal matter by artificial processes. It had often been remarked, that its odour is similar to that of the peach blossom, and that the same odour is perceptible in the distilled water of the cherry laurel, and of the bitter almond. This led to experiments on these; whence the fact, rather singular, has been discovered, that all of them contain this acid. The fact, not less important, has been

established, that the narcotic property possessed by these distilled waters depends on the prussic acid. In its insulated state, this substance is volatile, so that it escapes even from its watery solution under exposure to the air. It has no sensible sourness, and does not redden even the more delicate vegetable colours. The character of acidity is therefore given to it, rather from its powers in the combinations it forms, especially those with the metallic oxides, than from its properties in its insulated state.

Several of the vegetable acids, particularly the citric, malic, and tartaric, exist together in the same vegetable, and in proportions varying according to the stage of vegetation, whence it is probable that they are mutually convertible. They seldom exist pure, but generally in combination with saccharine, mucilaginous, and extractive matter. Combined with alkaline and earthy bases, they form what have been named the essential salts of plants.

The last of the proper proximate principles of vegetables is Lignin, or wood; the substance which, composing the vessels of the plant, is the basis through which the other principles are diffused, or to which they are attached, and which is the basis therefore of all the parts of vegetables, with the exception of their secreted juices. It is, when freed from the principles diffused through it, insipid, inert, and insoluble, liable in a humid state to slow spontaneous decomposition, inflammable, and decomposed by heat, leaving a large residuum of charcoal, which indicates carbon to be its predominant ingredient, whence probably arises its solidity and comparative chemical inactivity. Being insoluble in water, or in alcohol, it forms the greater part of the residuum, when the active matter of vegetable substances has been abstracted by maceration in these solvents.

Besides the principles which can thus be obtained in a distinct form from vegetables by analysis, there are others of a more subtle nature, which have been supposed to exist in vegetable matter, though scarcely

capable of being exhibited in an insulated state; such are the Aroma or Spiritus Rector of plants, the Acrid Principle, the Bitter Principle, and the Narcotic Principle.

The Aroma is the principle in which the odour of plants has been supposed to reside. This quality is generally found in the essential oil; but there are some vegetables, having a strong odour, which yield little or no essential oil, such as the jessamine, the violet, or the rose; or, if this oil be procured from them in small quantity, it has not that strength of odour which, considering their fragrance and the smallness of its quantity, might be expected from them. They exhale this odour, however, when exposed to the air; it is at length dissipated, or it is communicated to water by distillation at a very gentle heat. Hence it has been concluded, that a principle more subtle than the essential oil exists in which the odour resides, and that it is even this principle which communicates odour to the oil.

These facts, however, are altogether inconclusive. The property of odour may belong to any of the proximate principles of vegetables, and does belong to principles of very different kinds; it exists in other bodies in which we cannot suppose the existence of any common principle; nor is their any reason to assume the existence of such a principle in plants; and all the facts, which have been considered as favourable to the opinion, are accounted for on the supposition that essential oil is the more common principle of odour, and is capable of being volatallized in small quantity at a low temperature, and of thus being diffused through the atmosphere, or communicated to water.

The existence of an Acrid Principle has been inferred from an acrimony residing in some plants, which they lose on drying, while their other active powers remain; and from this acrimony being in some cases transferred to water or alcohol by distillation. It is not very certain, however, if this quality is not in such cases connected with some of the known proximate principles;

nor has this acrid principle, if it do exist, been obtained so as to submit it to chemical examination.

A principle has been supposed to exist in some of the vegetable bitters in which their bitterness resides. It is obvious, however, that the quality of bitterness may belong to any of the known proximate principles; and the qualities which have been assigned to this principle as it exists in some vegetables, particularly in gentian or quassia, such as equal solubility in water and in alcohol, and being precipitated by certain re-agents, rather prove it in these cases at least to be a variety of extractive matter.

A Narcotic Principle has been supposed to exist, from the narcotic power of some vegetables being impaired by age, without any apparent loss of matter, and from its being rendered inert by decoction, though no volatile matter is collected possessed of the quality. But such facts are rather favourable to the conclusion, that the loss of power is owing to chemical changes in one or other of the known principles, probably the extract, in which the narcotic quality may be supposed to reside. In submitting opium to analysis, it has been affirmed, that a crystalline matter is obtained, which proves narcotic, and has been supposed to be the principle on which that quality possessed by the opium depends. But it does not, admitting its existence, appear to be possessed of the narcotic property in that high degree we should expect, were it the principle on which that property is dependent, nor is there any proof that it exists in any other narcotic.

The existence of all these principles, therefore, is extremely problematical; and the qualities assigned to them may, with much more probability, be referred to modifications of composition in the known principles, which are probably too subtle to be ever determined by chemical analysis.

Alcohol, and the Ethers formed from it by the action of acids, cannot be regarded as vegetable products; yet they have a relation to these, as their chemical constitution is similar, and they cannnot be formed but by changes produced in vegetable matter. As important medicinal, and pharmaceutic agents, they are entitled to notice.

Alcohol is formed by the process of fermentation from saccharine matter, or from fecula, the latter being previouly subjected, partially at least, to the operation of malting, by which it is in fact converted into the former. The fermented liquor being distilled, affords the alcohol formed during the process, diluted with water, and with some impregnation of odour from the fermented substance. From this pure alcohol is procured by repeated distillation, the abstraction of the water from it being aided by the action of potash, or rather sub-carbonate of potash.

Alcohol is a colourless transparent fluid, having a specific gravity, according to its state of concentration, from 0,835 to 0,800; it is fragrant and pungent, and in its action on the living system possesses a high degree of stimulant and narcotic power; it is volatile, and inflammable, affording, during its combustion, no products but water and carbonic acid, the quantity of water exceeding even the weight of the alcohol. It contains, therefore, much hydrogen in its composition, with which carbon is combined, and perhaps also a portion of oxygen. It combines with water in every proportion, and, in consequence of the affinity between these fluids, they mutually precipitate substances which either has dissolved, that are insoluble in the other. It is decomposed by the acids, affording, as the principal product, the different ethers. As a pharmaceutic agent, it is of much importance from the solvent power it exerts on a number of the vegetable proximate principles,—essential oil, camphor, extract and others, and by its property too of counteracting the spontaneous changes to which vegetable matter is liable.

Ether. The name Ether is given to a peculiar product obtained by the action of the more powerful acids on alcohol, the product differing in its properties according to the acid employed in its formation, but in general being extremely light, volatile, and inflammable. Sulphuric ether, formed by the action of sulphuric acid on alcohol, has a specific gravity not greater, when it is pure, than 0.716; it is so volatile as to evaporate rapidly at the common temperature of the atmosphere; in burning it affords water and carbonic acid: its odour is fragrant and penetrating; its taste pungent; it is soluble in water only in limited proportion, about one part in ten. It exerts on the vegetable principles the same solvent action nearly as alcohol, except on extract which it has been said to precipitate,—an effect, however, I have not been able to obtain from it. Nitric ether is equally light and even more volatile; it is inflammable; it is soluble in water in limited quantity, but combines with alcohol in every proportion: its odour is strong and penetrating. Muriatic ether is more volatile than either, existing in the state of gas, under the atmospheric pressure, at 60 deg. at 50 it becomes liquid, and its specific gravity is not less than 0.874; it is transparent, colourless, odorous, and pungent. Acetic ether is moderately light, volatile, and inflammable, soluble in water in limited quantity, and has an odour ethereal, but approaching also to that of vinegar. All these ethers appear to differ from alcohol, principally in having a larger proportion of hydrogen in their composition, to which probably their greater levity and volatility are to be ascribed; and they generally contain a portion of the acid by the action of which they have been formed, which, in some of them at least, appears essential to their chemical constitution.

Having pointed out the distinguishing properties, and the general pharmaceutic relations of the Proximate

Principles of Vegetables, it may be proposed as a question important in relation to the object of the present outline, Do these principles usually exist in the vegetable in a state of chemical combination, whence some modification of their powers might result, or are they more generally mechanically mixed?

The latter appears to be generally the case. These principles can often be observed existing apart from each other, and even placed in separate vesicles; they can in many cases be separated by mechanical means; and even where they are more intimately mixed, that change of properties does not take place, which we must have expected were they chemically united, the virtues of each principle being discernible in the entire mixture, weakened, but not changed. It seems to follow, therefore, that the virtues of vegetable substances do not depend on chemical combinations of their proximate principles, but rather on the peculiar ultimate composition, of one or other of these principles. Hence also it is evident, that in separating the proximate principles of any vegetable, we cannot expect to alter or improve its virtues, farther than in concentrating them by a separation from what is inert, or in separating principles which are possessed of different or even opposite powers. The attainment even of these ends, however, is, in innumerable cases, of importance in their exhibition as medicines.

From this enumeration of the Proximate Principles of Vegetables, we may perceive the reasons for those pharmaceutic processes to which plants are usually subjected.

Vegetable matter being liable to decomposition when in a humid state, from the re-action of its elements and their entering into new combinations, exsiccation is an operation to which they are generally subjected, to preserve them without injury. It is performed either by the action of a current of air, or by exposure to heat, care being taken that the heat shall not be such as to dissipate any of their volatile principles, or cause any chemical change.

By Infusion in water, the fluid is impregnated with

the gum, sugar, extract, tannin, saline substances, part of the essential oil, and part also of the resinous principle. The aroma of the plant is generally first taken up: by longer infusion the water is loaded with the colouring, astringent, and gummy parts: these are also most abundantly dissolved when the temperature is high.—Hence an infusion differs according as the water has stood longer or shorter on the materials, and according as it has been promoted or not by heat. An infusion made in the cold is in general more grateful, while one made with heat, or by keeping the fluid long upon the materials, is more strongly impregnated with active matter.

By Decoction or boiling, the solvent power of the water is still farther increased; and hence the liquor always appears darker coloured, and is, in fact, more loaded with the principles of the vegetable which it can hold dissolved. The volatile parts, however, particularly the essential oil, are entirely dissipated; and therefore it is an improper process for those vegetables whose virtues depend, wholly or partially, on these parts. Even the fixed principles of vegetables, at least some of them, are injured by long decoction. The extractive matter, for instance, gradually absorbs oxygen from the atmosphere, and is converted into a substance nearly insipid and inert. Opium, Peruvian bark, and many other vegetables, are injured in this manner by decoction, especially if the atmospheric air is freely admitted; and these two circumstances, the dissipation of the volatile matter, and the oxygenation of the extractive, considerably limit the application of this process. It is still used, however, with advantage, to extract the mucilaginous parts of vegetables, their bitterness, and several others of their peculiar qualities.

Alcohol may be applied to vegetables to extract those principles which are not soluble in water. It dissolves entirely their essential oil, camphor, and resin; and as these are often the parts on which the virtues of vege-

tables depend, these solutions, or Tinctures as they are termed, are often active preparations.

Equal parts of alcohol and water, in general, extract still more completely the active matter of plants, as we thus obtain a solution of all those substances which are separately soluble in either of these fluids.

When by the action of one or both of these fluids, we obtain a solution of the active principles of a vegetable, the solution may be evaporated to the consistence of a thick tenacious mass. This forms what is termed an extract: it is named an Aqueous Extract when obtained from the aqueous infusion or decoction of a plant, and Spiritous when alcohol has been the solvent. The design of this preparation is to obtain the active matter of the vegetable in a small bulk, and in such a state that it may be preserved a long time without suffering any alteration. It is evident, that it is a process which can be properly applied to such plants only as have their virtues dependent on some of their fixed principles, and even these are often injured by the heat applied, and the free access of the atmospheric air.

Distillation is another process applied to vegetable substances, by which we obtain some of their active principles, particularly their essential oil. If the vegetable matter be heated with a large portion of water, the oil is volatilized with the aqueous vapour: it separates from the water on being allowed to remain at rest; a part of it, however, is also dissolved, and communicates to the water a considerable degree of flavour, and often also of pungency. This forms what are named Distilled Waters. If alcohol is used instead of water, the essential oil is completely dissolved in it, and we thus obtain what are termed Distilled Spirits.

By such processes we extract the active matter of vegetables from the inert matter with which it is more or less mixed, and are enabled to administer many remedies under a variety of forms, suited to particular circumstances. A single example will show the utility of investigations of this kind, respecting the component

principles of vegetable products, and their relations to the more important chemical agents. Peruvian bark is one of the most important remedies in the Materia Medica. Practitioners have not always found it practicable to exhibit it in substance with advantage, as where the stomach is uncommonly irritable, or where from the nature of the disease, it is necessary to give it in large doses, frequently repeated, it is apt to occasion sickness and other uneasy sensations, and even to be rejected by vomiting. Such inconveniences are attempted to be obviated, by giving it in the different forms of infusion, decoction, tincture or extract, as any of these may be, best suited to the case. Our knowledge of its constituent parts can only lead us to the proper application of these processes. From an accurate analysis of this bark, it has been proved that seven parts out of eight consist of woody fibre, or of a matter inert and insoluble, which cannot act on the system, and which affects the stomach only by its weight and insolubility. The remaining eighth part is that in which the activity of the medicine resides: it is therefore evident that if this be extracted, without injuring its activity, the medicine could be exhibited with much more advantage. This is in part accomplished by the preparations of it that have been mentioned ; but even these do not convey it in all its force. If one ounce of the bark be infused or boiled in a certain quantity of water, the infusion or decoction is not nearly equal in efficacy to the whole quantity of bark operated on. It is therefore evident, that during either of these operations, the active matter of the bark has not been entirely extracted, or has suffered some change. And here chemistry lends her assistance, and still farther elucidates the peculiar nature of this substance, and the changes produced in it by these processes. It has been proved by experiment, that the matter on which the power of the bark depends, has a strong attraction for oxygen at a temperature moderately increased ; that during the infusion, and particularly during the decoction of that drug, this active matter absorbs oxygen from the atmosphere, and

is converted into a substance insipid and inert. This leads to the improvement of the preparations of this medicine; and experiments instituted for the purpose have accordingly proved, that, while by long boiling the virtues of the bark are nearly totally detroyed, they are fully extracted by a few minutes' decoction in covered vessels. The same investigations have pointed out the nature of the action of some other substances on bark, formerly not well understood. Thus, it has been found by experience, that the alkalis, and more particularly magnesia, enable water to extract the virtues of bark, more completely by infusion,—a circumstance elucidated by the fact since discovered, that the extractive matter of the bark, to which its activity is owing, combines with facility with these substances and forms soluble compounds.

Similar examples might be given from several other important vegetable remedies, which would sufficiently prove the utility to be derived from the analysis of the substances belonging to the vegetable kingdom, and that indeed researches of this kind are absolutely necessary for their proper preparation as medicines.

The account of the analysis of animal substances, and of their proximate principles, would, to the same extent at least, be foreign to the objects of this sketch, as so few of these substances are employed in medicine; and of those which are used, the composition and consequently the pharmacuetic treatment, are in a great measure peculiar to each.

Their general chemical characters are similar to those of vegetable principles.—Composed of a few ultimate elements, the differences in their properties arise in a great measure from the different proportions, or the different modes in which these are combined. And these elements having powerful reciprocal attractions, and being disposed to enter into combinations almost indefinitely diversified with regard to these circumstances, these substances are extremely susceptible of decomposition, from the re-action of their elements, favoured by

humidity, by the action of the air, or by elevation of temperature. They are even more liable to this than vegetable substances; for their elements existing in simultaneous combination are more numerous, their affinities are therefore more nicely adjusted, and of course the equilibrium is more easily subverted.

Along with carbon, hydrogen, and oxygen, which are the chief constituent principles of vegetable matter, nitrogen, and frequently sulphur and phosphorus, enter into the composition of animal substances. Hence, when decomposed by heat, they afford products composed of these, of which ammonia is always the principal; and the re-action of these principles, and the evolution of the products arising from this, seem principally to form the series of changes which constitute putrefaction, the species of spontaneous decomposition to which animal matter is more peculiarly subject.

Like vegetable substances, the animal products consist of various proximate principles, and some analogy may be traced between several of the vegetable and animal proximate principles. Animal fat has a strict connection in properties and composition with fixed oil; animal mucus resembles vegetable mucilage; fecula has a similar relation to gelatin; vegetable and animal gluten are nearly if not entirely the same; a substance similar to saccharine matter exists in milk, and in some of the other animal secretions: in the bile is found a principle strictly analogous to resin; and benzoic, oxalic, and acetic acids are common to both. Hence, generally speaking, the few animal substances belonging to the Materia Medica are acted on by the usual solvents in nearly the same manner as vegetable substances, and are submitted to similar pharmaceutic processes. The result of these are similar officinal preparations. Thus by the action of alcohol, the active matter of musk, castor, and cantharides is extracted, and tinctures of these are employed. In other cases water is the proper solvent, particularly of those which consist of gelatin; but such solutions being very liable to decomposition, must always be of extemporaneous preparation.

CHAPTER II.

OF THE PHARMACEUTICAL OPERATIONS TO WHICH THE ARTICLES OF THE MATERIA MEDICA ARE SUBJECTED.

Natural substances, it has been remarked, are not always obtained in that state in which they are best adapted to exhibition as remedies. They are subjected, therefore to various processes, with the view of preserving them, or of preparing them for use; and to complete this statement of the Principles of Pharmaceutic Chemistry, the nature of these is to be pointed out.

These processes, or at least the greater number, and the most important of them, are chemical, and are dependent therefore on the agencies of those general forces whence chemical changes arise; they are indeed little more than applications of these, under peculiar regulations adapted to different substances. The general facts, therefore, connected with the operation of these forces, are first to be stated. in so far as they have any relation to the present subject.

The force principally productive of chemical action, is that species of attraction exerted between the particles of bodies, which brings them into intimate union. If two substances of different kinds be placed in contact, and with that degree of fluidity which admits of the particles of the one moving to those of the other, it often happens that they unite together, and form a substance in which neither can be any longer recognised, and which is homogeneous, and in general possessed of new properties. This constitutes what, in the language of chemistry, is named combination, and is conceived to arise from an attraction exerted between the particles of the one body to those of the other. It is this which is denominated Chemical Attraction or Affinity, and

which is distinguished from the other species of attraction by the phenomena to which it gives rise, or by the laws it obeys,—from the attraction of gravitation, by not being exerted at sensible distances, or on masses of matter, but only at insensible distances, and on the minute particles of bodies,—from the attraction of aggregation, by being exerted between particles of different kinds, and forming a substance with new properties, while that force operates on particles of a similar nature, and of course unites them into an aggregate in which the same essential properties exist. It is possible that these forces, though thus distinguished, may be the result of the same power modified by the circumstances under which it acts.

The substance formed by chemical combination is named a compound. The substances united are the constituent or component parts or principles of the compound. When these are separated, the process is named decomposition. The most minute parts into which a body can be resolved without decomposition, are named its integrant parts; and it is between these that the force of aggregation is conceived to be exerted. Chemical attraction is exerted between the constituent parts.

The most important phenomenon attending chemical combination is a change of properties. In general the form, density, colour, taste, and other sensible qualities, as well as the fusibility, volatility, tendency to combination, and other chemical properties in the compound, are more or less different from what they are in either of its constituent parts, and frequently indeed they are wholly dissimilar. There are cases too, however, where the change is less considerable, as is exemplified in several of the operations of Pharmacy,—the solution of the vegetable proximate principles in water or in alcohol, or the solution of salts in water, in which the body acquires merely the liquid form, with perhaps a slight change of density, but in which no important property is changed, nor any new one acquired.

Chemical attraction is not an invariable force exerted by every body to every other, and always with the same degree of strength. Between many substances it does not sensibly operate, though this perhaps may be owing to the predominance of external circumstances, by which its operation is influenced, rather than to the absence of all mutual attraction. It is exerted too by each body towards others, with different degrees of strength.

It is not limited in its action to two bodies, but is frequently exerted at the same time between three, four, or a greater number, so as to unite them in one combination. Such compounds are named Ternary, &c. according to the number of their constituent principles; they are abundant among the productions of nature, and can be formed also by the arrangements of art.

This force is exerted too, so as to combine bodies in more than one proportion; and, from the union of two substances in different proportions, compounds are formed frequently as dissimilar in their properties as if they were composed of principles totally different. In some cases, the combination is unlimited with regard to proportions; in others, it is fixed to two or three relative quantities, and there are examples where it can be established in only one proportion. The opinion has been maintained, and is probably just, that the tendency of chemical attraction is to unite bodies indefinitely with regard to proportion, and that determinate proportions are established only by the operation of external forces.

The compounds formed by the exertion of chemical attraction have apparently the same relation to this power as simple bodies have: they have a similar tendency to combination, unite in different proportions, and with different degrees of force; and all these combinations are accompanied by the same phenomena, and appear to observe the same laws. It has been supposed, however, that when compound substances combine together, the combination is the result, not of the mutual attraction between the integrant particles of these com-

pounds, but of the affinities of their ultimate elements modified by the condition in which they exist.

In all cases, attraction is much modified, and its results determined by circumstances foreign to the attractive force itself. The operation of these circumstances has been established with more precision by the labours of Berthollet, and been proved to be more important than was formerly believed. They require, therefore, more distinct enumeration, especially as some of them give rise to important results in the processes of Pharmacy.

1st. Quantity of matter influences affinity, an increase in the relative quantity of one body with regard to another enabling it to act with more force; or, as the law has been stated, "every substance having a tendency to "enter into combination, acts in the ratio of its affinity "and its quantity." Hence an effect can be produced from the mutual action of two bodies, when one is in a certain relative proportion to the other, which will not be obtained when the proportion is changed,—a circumstance of much importance in Pharmacy, requiring, in particular, attention towards insuring the uniform strength of active preparations; and of much influence too on the results of chemical decomposition, rendering it frequently partial, where it was supposed to be complete.

2d. Cohesion, or the state of a body with regard to the aggregation of its integrant particles, must obviously modify the chemical action of another body upon it, by opposing a resistance which must be overcome before the union of their particles can be effected; hence the cause, that two solid bodies seldom act chemically on each other, and that fluidity promotes chemical action. But besides this obvious effect, cohesion, even when it has been overcome, still modifies the exertion of chemical attraction, by resuming its force whenever the force of that attraction is diminished, and thus sometimes giving rise to new combinations; and sometimes too, when suddenly established in consequence of the

affinities becoming effective, it determines the proportions in which bodies combine, by insulating the compound at a certain stage of the combination. It is thus the most powerful cause in placing limits to the exertion of chemical attraction. INSOLUBILITY is merely the result of the force of cohesion, in relation to the liquid which is the medium of chemical action, and its action is of course similar; and great DENSITY, or specific gravity, so far as it influences attraction, operates in nearly the same manner, counteracting it, by withdrawing the substances between which it is to be exerted from the sphere of mutual action.

3d. ELASTICITY, or that property of bodies arising from repulsion between their particles, and present to any extent only in those existing in the aëriform state, opposes the exertion of chemical attraction, by enlarging the distances at which these particles are placed. Hence aërial fluids combine in general with difficulty; and hence too, a compound which contains an ingredient which, when insulated, assumes the aërial state, is more easy of decomposition, and the decomposition is more complete, than a compound, the ingredients of which are fixed; for the tendency to elasticity in the volatile ingredient counteracts the mutual affinity; and when, by the application of heat, or the operation of a superior attraction, any portion of it is displaced, by assuming the elastic form it is withdrawn from the sphere of action, and ceases to oppose any obstacle by its affinity or quantity to the progress of the decomposition. Elasticity too, by counteracting attraction, places limits to the proportions in which bodies combine.

4th. The last circumstance influencing attraction is TEMPERATURE, or the state of a body with regard to heat or cold, which sometimes favours, and in other cases subverts combination. The cause of temperature is a peculiar subtle power or principle, (in modern chemical language denominated Caloric) capable of being communicated to bodies, and of being in part at least withdrawn from them. Its immediate tendency is to

establish a repulsion between their particles; hence it gives rise to expansion or enlargement of volume, greater in each body according to the quantity of caloric introduced. This progressive augmentation of distance, at which the particles are placed by its action, is accompanied with a proportional diminution in the force of cohesion; if carried, therefore, to a certain extent, that force is so far modified, that the particles become capable of moving easily with regard to each other,—a state which constitutes fluidity; and, if the communication of caloric be continued, the expansion still continuing, the particles are at length placed at such distances, that the attraction is entirely overcome, and they repel each other,—a state which constitutes the aërial or gaseous form. The operation of caloric in influencing chemical attraction, appears to depend on the changes it occasions in the cohesion and elasticity of bodies,—favouring combination by diminishing cohesion, counteracting or subverting it by communicating or increasing elasticity; these effects too being often produced together, and modifying each other.

From the differences of the forces of affinity among bodies, or still more perhaps from the operation of those circumstances by which affinity is modified, its power is often suspended or overcome, and substances which have been combined are separated. This forms what in Chemistry is named Decomposition, and it presents results equally important with those from combination.

The decomposition may be simple, that is, a compound may be resolved into its constituent parts, each of which is insulated. This is in general effected by the agency of heat. Within a certain range of temperature, the affinity which has combined two bodies continues to operate; but when the temperature is raised, and when the bodies differ in their volatility, or the tendency they have to assume the elastic form, the elasticity of the more volatile one is so far favoured by the elevated temperature, that the mutual affinity is overcome, and it is disengaged. It is generally obtained pure; but the fixed

substance, from the influence of quantity on chemical attraction, frequently retains a portion of the other combined with it.

Decomposition is more complicated when it is produced by the introduction of a third substance, which exerts an attraction to one of the ingredients of a compound. When this is effective, the body added combines with this ingredient forming a new compound, and it is only the other ingredient of the original compound that is obtained insulated. A case still more complicated is, where two compound substances are brought to act on each other, and the principles of the one exert affinities to those of the other; so that an interchange takes place, the two compounds are decomposed, and two new ones are formed. Both these kinds of decomposition are likewise materially modified by the state with regard to temperature. The former case used to be named by chemists single elective attraction; the latter double elective attraction; and both were considered as the results of the relative forces of attraction among the bodies concerned. But there is reason to believe, that they arise from the operation of cohesion, elasticity, and the other forces that influence attraction; and that but for the operation of these forces, three or more bodies presented to each other would enter into simultaneous union, instead of passing into binary combinations.

Galvanism, as well as caloric, influences chemical affinity, and, by the attractive as well as by the repulsive force it exerts, is even more powerful in producing decomposition. It scarcely admits, however, of being applied to any pharmaceutic process.

The OPERATIONS of Pharmacy are generally dependent on these chemical powers; they consist of arrangements of circumstances, with the view either of promoting their exertion, or of obtaining the products of chemical action.

Some preliminary operations are frequently had recourse to, of a mechanical nature, to diminish the cohesion of bodies, or enlarge their surface. Such are Pul-

verization, Trituration, Levigation, Granulation, &c. PULVERIZATION is the term employed where solid bodies are reduced to powder by beating: TRITURATION that where the same effect is produced by continued rubbing. LEVIGATION denotes the operation where the powder is rubbed to a still greater fineness, the rubbing being facilitated by the interposition of a fluid, in which the solid is not soluble. As by any of these operations, the powder must consist of particles of unequal size, the finer are separated from the coarser by sifting or washing. Sifting is passing the powder over a sieve, the interstices of which are so minute, as to allow only the finer particles to pass. WASHING or ELUTRIATION, is an operation performed only on substances which are not soluble in water. The powder is diffused through a quantity of that fluid, and the mixture is allowed to remain at rest. The coarser particles quickly subside, and the finer remain suspended. It is then decanted off, the powder is allowed to subside, and is afterwards dried.—These methods of reducing bodies to powder, can be applied to very few of the metals, their force of cohesion being too strong. They are mechanically divided by rasping, or by being beat into leaves, or they are granulated,—an operation performed by melting the metal, and when it is cooled down as far as it can be, without becoming solid, pouring it into water: it passes to the solid state, assuming the granular form.

In Pharmacy, these operations are sometimes of importance, besides merely promoting chemical combination, as there are some medicines which act with more certainty, and even with more efficacy, when finely levigated, than when given in a coarse powder.

As means of promoting chemical combination, it is evident, that they can act only indirectly; the bodies being far from being reduced to their minute particles, between which only chemical attraction is exerted. They are therefore employed, merely as preliminary to those operations in which such a division is obtained by chemical means.

Of these, the first is Solution. By this is understood that operation in which a solid body combines with a fluid in such a manner that the compound retains the fluid form, and is transparent. Transparency is the test of perfect solution. When the specific gravity of a solid body differs not greatly from that of a fluid, it may be diffused through it, but the mixture is more or less opaque; and on being kept for some time at rest, the heavier body subsides; while in solution the particles of the solid are permanently suspended by the state of combination in which they exist, and are so minute as not to impair the transparency of the liquid.

The liquid has, in this case, been regarded as the body exerting the active power, and has been named the Solvent or Menstruum; the solid is considered as the body dissolved. The attraction, however, whence the solution proceeds, is reciprocal, and the form generally proceeds from the larger quantity of the liquid employed, and from the absence of cohesion being more favourable to the combination proceeding to a greater extent.

In general, the solution of a solid in a liquid can be effected only in a certain quantity. This limitation of solution is named Saturation; and when the point is reached, the liquid is said to be saturated with the solid. As the fluid approaches to saturation, the solution proceeds more slowly. When a fluid is saturated with one body, this does not prevent its dissolving a portion of another; and in this way three, four, or five bodies may be retained in solution at the same time by one fluid. In these cases, the fluid does not dissolve so large a proportion of any of these substances, as if it had been perfectly pure, though sometimes the whole proportion of solid matter dissolved is increased from the mutual affinities the bodies exert. Neither is the solvent power always thus limited, there being many cases where a solid may be dissolved in a fluid to any extent. Gum or Sugar, for example, will dissolve in water, and form a perfect solution in every proportion.

An increase of temperature, in general, favours solu-

tion, the solution proceeding more rapidly at a high than at a low temperature; and in those cases in which a certain quantity only of the solid can be combined with the fluid, a larger quantity is taken up when the temperature is increased. The quantity dissolved is not in every case promoted alike by an increase of temperature; water, for example, having its solvent power, with regard to nitre, greatly increased by augmentation of temperature, while sea salt is dissolved in nearly as great a quantity by water at a low as at a high temperature. This difference in these salts, and in many others, depends on the difference in the degree of their fusibility by heat; those which are most easily fused having their solubility in water most largely increased by increase of temperature. All these facts, indeed, with regard to solution, are explained, by considering this operation as depending on chemical affinity overcoming cohesion in the body dissolved.

Agitation favours solution, by bringing successively the different parts of the liquid into contact with the solid, and thus preventing the diminished effect which arises from the approach to saturation in the portion immediately covering the solid. The mechanical division of a solid too, is favourable to its solution, principally by enlarging the surface which is acted on.

Solution is an operation frequently had recourse to in pharmaceutical chemistry, the active principles of many bodies being dissolved by their proper solvents. Salts are dissolved in water, as are also gum, extract, and other vegetable products. Products of a different kind, as resin, camphor, and essential oils, are dissolved in alcohol and wine; and metals are rendered soluble and active by the different acids. Solutions in water, alcohol, or wine, possess the sensible qualities and medical virtues of the substance dissolved. Acid and alkaline liquors change the properties of the bodies which they dissolve. In Pharmacy, the operation receives different appellations, according to the nature of the solvent, of the substance dissolved, and of the manner in which it is performed.

When a fluid is poured on any vegetable matter, so as to dissolve only some of its principles, the operation is named Extraction, and the part dissolved is said to be extracted. If it is performed without heat it is termed Maceration; if with a moderate heat, Digestion; if the fluid is poured boiling hot on the substance, and they are kept in a covered vessel till cold, this is denominated Infusion. Decoction is the term given to the operation when the substances are boiled together. It is evident, that these are all instances of solution, varied only by particular circumstances; and I have already stated, under the analysis of the vegetable part of the Materia Medica, the advantages belonging to each. Lixiviation is the term applied to solution performed on saline substances where the soluble matter is separated by the action of the solvent, from other substances that are insoluble; and the solution obtained in this case is named a Ley.

The other principal method by which that fluidity necessary to chemical action is communicated, is Fusion. It requires, merely with regard to each substance, the necessary degree of heat; and where this is high, it is performed usually in crucibles of earthen ware, or sometimes of black lead, or on a large scale in iron pots.

Chemical combination is frequently promoted by an elevation of temperature, though the heat may not be so high as to produce fusion, but only to diminish cohesion to a certain extent. Calcination, as it used to be named, or metallic oxidation, is an example of this; a metal being heated to a high temperature, so as to enable it to combine with the oxygen of the air. Deflagration is a similar operation, an inflammable or metallic substance being exposed to a red heat in mixture with nitre: the acid of the nitre yields its oxygen; which being thus afforded in large quantity and nearly pure, the oxidation takes place with rapidity, and generally to its *maximum*.

When chemical action has been exerted, other opera-

tions are sometimes required to obtain the product, or sometimes this product is formed and collected in the operation itself.

By EVAPORATION, or dissipating a liquid by the application of heat, a solid substance which has been dissolved in it is recovered, and this operation is one frequently performed in Pharmacy. When performed on a small scale, vessels of glass, or of earthen ware, are generally employed, and the heat is applied either by the medium of sand, or if it is required to be more moderate, the vessel is placed over water which is kept boiling, forming what is named the Water Bath, or *Balneum Mariæ.* When performed on a larger scale, shallow iron pots or leaden troughs are used, to which the fire is directly applied; and experiments have shown that the operation is conducted more economically when the liquor is kept boiling strongly, than when it is evaporated more slowly by a more gentle heat. There is, on the other hand, however, some loss, from part of the dissolved substance being carried off when the heat is high, by its affinity to the liquid evaporating; and in many cases in Pharmacy, particularly in the evaporation of vegetable infusions or tinctures, the flavour, and even the more active qualities of the dissolved substance, are liable to be injured, especially towards the end of the operation, by a strong heat.

When the object is to obtain the volatile matter by evaporation, the process is of course conducted in close vessels adapted to condense the vapour and collect the liquid. This forms the operation of DISTILLATION, which, with regard to different substances, requires to be conducted in various modes.

When a volatile principle is to be obtained from vegetable substances by this process, the difficulty is to apply the heat sufficiently without raising it too high. The mode generally employed is to heat the vegetable matter with water, and the distillation is then usually performed in the common still. At the heat of boiling water, the essential oil of plants, which is the chief vo-

latile principle they contain, is volatilized; it rises with the watery vapour; is condensed; if little water has been employed, the greater part of the oil is obtained apart; if much has been used, it retains it dissolved, acquiring taste and flavour, and thus forming the distilled water of plants. If alcohol, pure or diluted, has been the medium of distillation, it always retains the oil in solution, and forms what are named Distilled Spirits. The still in which the operation is performed with these views is of copper or iron; it consists of a body and head, the former designed to contain the materials, and to which the fire is applied, the latter to receive the vapour; there issues from a tube, which is connected with a spiral tube, placed in a vessel, named the refrigeratory, filled with cold water. The vapour, in its progress through the tube, is condensed, and the liquid drops from the extremity of it.

When metallic matter would be acted on, by the materials or the product of distillation, vessels of glass or earthen ware are employed; the retort, which is generally used being connected with a single receiver, or with a range of receivers, according as the vapour is more or less easily condensed; or, if the product is a permanently elastic fluid, which cannot be condensed but by passing it through water, a series of bottles connected by tubes, on the principle of Woolfe's apparatus, is used. When the product obtained by distillation is not perfectly pure, it can be frequently purified by a second distillation; the process is then named *Rectification*: when it is freed from any superflous water combined with it, the operation is named *Dephlegmation* or *Concentration.*

When the product of volatilization is condensed, not in the liquid, but the solid form, the process is named SUBLIMATION, and the product a Sublimate. As the condensation takes place with much more facility, a more simple apparatus is employed, consisting usually of a conical bottle or flask with a round bottom thin and equal, named a Cucurbit, in which the materials are

contained, heat being applied by the medium of a sand bath. The vapour condenses in the upper part of the flask, forming a cake, which adheres to it, the orifice being lightly closed to prevent any part from being lost; or a globular head, with a groove at its under edge, and a tube to convey off any liquid that may be condensed, (a Capital as it is named,) being applied.

When a solid substance is thrown down from a liquid by chemical action, it forms the operation of PRECIPITATION, and the matter thrown down is named a Precipitate. Frequently the substance precipitated is one which had been dissolved in the liquid, and which is separated by a substance added, combining with the liquid, and weakening its attraction to the one which it held in solution. Or sometimes it arises from a compound being formed by the union of one body with another, which is insoluble in the liquid that is the medium of action. The precipitate is allowed to subside, is usually washed with water, and is dried. From the law of chemical attraction, that quantity influences the force of affinity, it often happens that the precipitate either retains in combination a portion of the substance by which it had been dissolved, or attracts a portion of the substance by which it is thrown down, and this sometimes proves a source of impurity, or of peculiar powers in medicinal preparations.

When a substance, in passing to the solid state, assumes a regular geometric form, the process is named CRYSTALLIZATION, and these figured masses are denominated Crystals. Their forms are various, though nearly constant with regard to each substance; they are usually transparent, hard, and have a regular internal structure. The crystallization may happen in two ways, from a state of solution. If a saturated solution has been prepared with the aid of heat, the increased quantity of the solid, which the heat has enabled the liquid to dissolve, separates as the temperature falls; and the attraction of cohesion being thus slowly exerted between the particles, unites them so as to form crystals. Or, if a

portion of the solvent be withdrawn by evaporation, and especially by slow evaporation, the particles of the solid unite slowly, and with a similar result.

In both these kinds of crystallization from a watery solution, the crystallized substance always retains a quantity of water, and frequently even a considerable proportion, in its composition. It is essential to the constitution of the crystal, its transparency, structure and form, and is hence named the Water of Crystallization. Some crystals lose it from mere exposure to the air, when they are said to effloresce; others attract water, and become humid, or deliquesce.

Crystallization is promoted by the mechanical action of the air; likewise by affording a nucleus, whence it may commence, and especially a crystal of the substance dissolved; and with regard to a few substances, their affinity to the solvent requires to be diminished by the addition of another substance to enable them to crystallize.

In Pharmacy, crystallization is of importance, by enabling us to obtain substances, especially those belonging to the class of salts, in a pure form; different salts, even when present in the same solution, being thus separated by their different tendencies to crystallization, according as they are more or less soluble is the solvent, or have their solubility more or less promoted by heat, and each salt, when it does crystallize, being in general pure.

These are the principal operations of Pharmacy. Connected with this subject, there remain to be noticed the weights and measures which are usually employed. The division according to what is named Troy weight, is that ordered in the Pharmacopœias. Its parts, with the symbols by which they are denoted, and their relative proportions, are represented in the following table:

A pound (libra,)	℔	contains	12 ounces.
An ounce (unica,)	℥		8 drachms.
A drachm (drachma,)	ʒ		3 scruples.
A scruple (scrupulus,)	℈		20 grains (grana) gr.

Measures have been subdivided in a similar manner, being made to correspond to the specific gravity of water. As the specific gravities of liquids vary, however, considerably, a source of error is introduced in applying the standard measure to different liquids, unless the due allowance be made for the difference in specific gravity. This it is to be presumed will often be neglected, and hence the Edinburgh College have rejected the use of measures, and given the proportions of every liquid by weight. The use of measures, however, in apportioning liquids, being more easy and convenient, will probably always be retained; and the London College have therefore, in the late edition of their Pharmacopœia, sanctioned their use. They adopt measures subdivided from the wine gallon, as represented with their symbols in the following table:

A gallon	(congius),		contains	8 pints,
A pint	(octarius),	O		16 fluidounces.
A fluidounce	(fluiduncia),	f℥		8 fluidrachms.
A fluidrachm	(fluidrachma,)	fʒ		60 minims, (minima) ♏

This last measure is one newly introduced. In apportioning liquids into very small quantities, the quantity has been usually estimated by drops (gutta, gtt.) allowed to fall from the edge of the mouth of a bottle; but the size of the drop is liable to vary much, not only according to the mobility and specific gravity of the liquid, a circumstance of little importance, since with regard to each substance it remains the same, but also according to the thickness of the edge and degree of inclination. The London College have therefore substituted this division of minims, which are measured in a slender graduated glass tube. The measures of a table and of a tea-spoonful are sometimes used in extemporaneous prescription, and, though not very accurate, may be admitted where a small difference in the dose is not important. The one is understood to be equal to half an ounce by measure, the other to about one drachm.

PART II.

OF MATERIA MEDICA.

MATERIA MEDICA, in the extensive signification which has sometimes been attached to the term, comprizes the history both of Aliments and of Medicines. It is used, however, and more correctly, as opposed to the Materia Alimentaria; and in this limited sense may be defined that department of Medicine, which describes the properties, and investigates the effects on the living system of those substances, which are employed as remedies against disease,—substances which are not necessary to the immediate support of the functions of life, to repair the waste of the body, or furnish matter whence its secretions are derived, but are more peculiarly adapted to excite actions in the system, or produce changes, with a view to the removal of morbid states. It includes the history of these substances, independent of the preparations to which they are subjected to fit them for administration, this belonging to the department of Pharmacy.

CHAPTER I.

PRELIMINARY OBSERVATIONS ON THE OBJECTS OF STUDY IN THE HISTORY OF THE ARTICLES OF THE MATERIA MEDICA, AND ON THEIR CLASSIFICATION.

The subjects of enquiry, in the study of the articles of the Materia Medica, may be comprised under their Natural History, their Chemical History, and what may be more strictly denominated their Medical History.

The utility of Natural History in furnishing appropriate characters by which the productions of nature may be distinguished from each other, is abundantly obvious; and its application to the articles of the Materia Medica is under this point of view indispensable. From want of such characters, the remedies described by the ancient physicians cannot now in many cases be accurately ascertained: did we not possess them, *our* observations would in the progress of time be liable to the same inconvenience; and the accurate distinctions which the methods of natural history afford, are at present necessary to discriminate between substances which have a near resemblance to each other, or to describe with accuracy the remedies employed in different countries.

This subject has likewise been considered under a higher point of view. From attention to the characters of the articles of the Materia Medica, as they are objects of natural history, it has been supposed, that assistance may be derived in the investigation of their virtues; these being sometimes indicated by their natural affinities. In artificial systems of classification, the discriminating characters are taken from one or two remarkable properties possessed by a certain number of bodies, and these are arranged together, though they may differ widely in the general assemblage of their

qualities. In the natural method, the arrangement is founded on the occurrence of a number of characters taken from what is essential to the substance ; the gradations of nature are observed, and those bodies are arranged together, which in their general appearance, nature, and qualities, have a close resemblance. It is the prosecution of this natural method that has been supposed useful in ascertaining the medicinal virtues of the productions of nature,—a supposition not unreasonable, since, where there exists a natural resemblance in structures and qualities, it might be inferred that there may be a resemblance in medicinal powers.

In the vegetable kingdom especially, this natural affinity has been industriously traced and applied to this purpose. Those vegetables which agree in their general structure, habit, and appearance, are thrown into what are named Natural Orders or Families ; and experience has shown, that the individuals composing many of these natural orders, have a remarkable similarity in their effects on the system. In the subdivisions of the order, this analogy is not less striking, the different species having in general similar virtues. If therefore, a new species of any of these genera be discovered, the discoverer may infer with some probability, *à priori*, that it will possess virtues similar to those of the genus to which it belongs.

This criterion of the virtues of medicines, though undoubtedly so far just, is however liable to many exceptions. Many natural orders are composed of vegetables, which, though they agree in structure, have the most various and opposite qualities ; and even in those in which there is in general the greatest similarity, there are found wide differences in the properties of many plants arranged under them. Even in the subdivision of the genus, there is often a remarkable difference in the properties of the species ; and what sufficiently points out the deficiency of this method, different parts of the same plants have often opposite powers. Yet it is to be admitted, that with all these exceptions, Na-

turalists have often been led by such analogies to just conclusions respecting the virtues of plants; and in studying the vegetable part of the Materia Medica, attention is undoubtedly due to these natural distinctions.

A part of the Natural History of Medicines, of still more importance than their generic and specific characters, is the accurate description of their sensible qualities.

Such descriptions afford the most obvious method of distinguishing them, and in many cases also the most easy and certain criterion of their purity and perfection.

A knowledge of these qualities is not less necessary, as it leads to their proper administration, since, from the peculiar qualities of taste, flavour, specific gravity, or consistence in any substance, one form may be better adapted to its exhibition than another.

It has also been imagined, that the sensible qualities of medicines, particularly their taste and smell, lead to indications of their peculiar powers, and experience to a certain extent confirms this supposition. In the vegetable kingdom especially, it has been found, that substances which are insipid and inodorous rarely possess any considerable medicinal virtues, and a number of such substances have justly been discarded from practice from attention to this circumstance: their insipidity having led to suspicion of their activity, and occasioned a more strict examination of the evidence on which their supposed virtues were said to be established. On the other hand, plants possessing much odour or taste, are in general active remedies; and those which resemble each other in these qualities, have often the same general medicinal powers: astringency is indicated by a styptic taste, bitters are tonics, aromatics are stimulating, and fœtids, narcotic.

There are, however, so many causes of obscurity and error in these indications, that they do not admit of very extensive accurate application. The different tastes and odours are so little reducible to precise definition

or description, that few general rules can be formed from them; and even to the few that have been delivered on this subject, there are many exceptions. The most active vegetable substances too, have not these properties more peculiar than many others comparatively inert, and hence it is not often that much assistance can be derived from this criterion of the virtues of plants.

The CHEMICAL HISTORY of the articles of the Materia Medica forms another important general object of investigation.

The opinion seems to have been early adopted by those who cultivated chemistry with a view to its application to medicine, that those substances which agree in their action on the system must be composed of the same principles, and that therefore chemical analysis may be a successful method of investigating their medical virtues—an opinion not altogether unreasonable. The properties of any compound depend on its peculiar chemical composition; they originate from that composition, and are altered by every variation which it suffers. The medicinal powers of such substances must, in common with their other qualities, depend on the same cause; and it is not unreasonable to presume, that where similar powers exist, they arise from similarity of composition, either with regard to the constituent principles, or to the peculiar mode in which these are united.

Confiding in the justness of these conclusions, the chemists, about the beginning of the 17th century, bestowed much labour on the analysis of the different vegetables used in medicine. Above 500 plants were analyzed; but had even the analysis been performed with all those essential precautions, which it was impossible that the state of Chemistry at that period could have furnished, the nature of it was such, that it could lead to no useful information. The plants subjected to analysis were exposed to heat, and the products collected; but as these products do not pre-exist in the vegetable, but are formed by new combinations of its ele-

ments, and as these elements are in all vegetables nearly the same, no connection can be traced between them and the qualities of the substances from which they are obtained. It was found accordingly, that the most inert and the most poisonous vegetable afforded the same products ; and if the experiment were now repeated with all the advantages of the rigorous methods of Modern Chemistry, no information useful to the physician would be obtained. Similar proximate principles of different plants, though possessed of different medicinal powers, would give similar results ; or if any difference were observed, it would be impossible to connect this with the difference in their powers. Nor can we expect from the chemistry, at least of our times, to be able to discover on what chemical principle, or what peculiarity of combination, the peculiar powers of any active vegetable productions depend ; for although these, in common with other qualities, may arise from chemical composition, yet the varieties of combination from which they may be supposed to derive their origin, are too minute to be detected by our modes of analysis.

The pretensions of modern chemistry, as applied to Materia Medica, are therefore more humble, but they are more just. By discovering those proximate principles of vegetables in which their active powers reside, and enabling us to separate them from each other, or from other inert and noxious matter with which they may be mixed, it allows us to apply them with much more advantage : it determines how far in every case such operations are useful : whether the principles thus operated on are altered by these operations, and by what means such alterations, if injurious, may be obviated. Similar advantages are obtained from its application to the few products of the animal kingdom that are employed in medicine ; and those belonging to the mineral kingdom can be used with much more advantage and discrimination, when their nature has been ascertained by analysis, than when we are left to collect their virtues from experience.

By the combinations which chemistry regulates, it furnishes us with many remedies which owe to these combinations their sole power, and which are equally active with many of those afforded by nature. Lastly, it has taught us the proper methods of administering these substances. Many of them exert a mutual action, combine together, or decompose each other; and were such facts which Chemistry discovers not precisely known, important errors would frequently be committed in their mixture and administration.

The last object in the study of the Materia Medica, that to which the others are merely subservient, is their MEDICAL HISTORY, or the investigation of the virtues and uses of remedies. This comprehends several important subjects of inquiry.

There belongs to it the consideration of the action of those substances on the system in its healthy state; since, when this is ascertained, it leads to their application to the treatment of disease. It may in general be affirmed, though the principle is not without exception, that substances which do not act sensibly on the body in a healthy state, will not prove active remedies: and that, on the contrary, every substance which is capable of producing any important change in the system, must be more or less extensively adapted to the removal of morbid affections.

Another subject of inquiry, scarcely less important, relates to the mode in which remedies act, and by which they produce their peculiar effects. It is not sufficient merely to have ascertained by the evidence of experience, the virtues of certain remedies in certain cases. It is of importance, farther, to arrange the facts thus collected; to institute some comparison between remedies possessed of nearly the same general power, and, so far as can be done, to investigate their mode of operation, with the view of extending their application, and of administering them with more precision.

Lastly, with regard to what may be more strictly termed the medicinal powers of remedies, there are a number of subjects of consideration of importance. It

is necessary to take notice of the applications for which each individual article is distinguished ; the forms of disease to which it is adapted ; the circumstances that may influence its operation, or in certain cases render its exhibition doubtful or improper ; the cautions necessary in its use ; the dose in which it is given ; the usual and proper forms of exhibition ; and the effects of the combinations of remedies with each other.

These observations point out the subjects to which the attention is principally to be directed in the study of the articles of the Materia Medica.

Very different systems have been followed, according to which these substances are arranged. The two which are least exceptionable, and which are possessed of undoubted advantages, are that founded on their natural distinctions, and that resting on their medicinal powers.

The latter ground of classification appears more systematic, and more conformable to the object of the study itself, than any other. These substances are subjects of inquiry, merely as possessed of certain medicinal properties : they ought to be classed, therefore, it might be concluded, on principles conformable to this : and by founding the classification on this basis, some important advantages are obtained : we are enabled to place together the remedies which are possessed of similar virtues, to deliver the theory of their operation, to compare the powers of the individual substances arranged under the class ; and by a reference to this generalization, to point out more distinctly their degrees of activity, and the peculiarities which may attend the operation of each.

The principal difficulty which attends it, is one arising perhaps from our imperfect knowledge of the laws of the animal economy, and of the operation of remedies, in consequence of which we cannot always assign their primary action, but are often under the necessity of arranging them from their more obvious, though secondary effects. Hence, as many substances are capable of producing various effects of this kind, and are actually employed in medicine to obtain this diversity of effect,

the same substance frequently requires to be considered under different classes, and under each its history is incomplete. It may be capable of acting, for example, as an emetic, as a cathartic, and as a diuretic: did we know precisely the primary operation of it, whence these effects arise, this might serve as the basis of its classification; but this being unknown, and the classification being established on these secondary operations, it must necessarily be placed under each of these classes, and under each, its history is imperfect; as it must be limited to the operation which gives the character of the class under which it is arranged.

In a course of Lectures this is extremely inconvenient; the history of almost every important article of the Materia Medica being placed under different divisions, frequently remote from each other, and no distinct and complete view of it being delivered. But in a treatise, to the different parts of which it is easy to refer, this is of less importance, and is more than compensated for, by the other advantages of which this method of classification is possessed. And when the merits of two modes of classification are so nearly balanced, it is even of importance to exhibit the subjects connected with them, under the points of view which each mode more peculiarly affords. It is this classification, therefore, which is followed in the present work.

CHAPTER II.

GENERAL VIEW OF THE OPERATIONS OF MEDICINES, AND OF THEIR CLASSIFICATION FOUNDED ON THESE OPERATIONS.

The advantages of an arrangement of the articles of the Materia Medica, founded on their medicinal operations, I have stated under the preceding observations; and in endeavouring to exhibit this branch of medicine, strictly as a science, it is that undoubtedly which ought to be followed. The difficulty of constructing such an arrangement, has at the same time always been experienced. No subject is involved in greater obscurity, than what relates to the action of substances on the living system. Their effects are not always easily appreciated with accuracy, especially in a state of disease, and our knowledge of the laws of their action is extremely imperfect. When we attempt, therefore, to class them according to these actions, we can scarcely form an arrangement strictly just and systematic, but are forced to admit of some deviations, and to be guided not unfrequently by imperfect analogies.

The difficulty of constructing a classification of medicines from their operations, will be apparent from the failure even of Cullen, when he attempted the execution of this task; for there can now be little hesitation in affirming, that the one he has given, rests on principles nearly altogether false. The following table represents this classification:

MEDICAMENTA AGUNT IN

SOLIDA.

Simplicia.
- *Astringentia.*
- *Tonica.*
- *Emollientia.*
- *Erodentia.*

Viva.
- *Stimulantia.*
- *Sedantia.*
  - *Narcotica.*
  - *Refrigerantia.*
- *Antispasmodica.*

FLUIDA.

Immutantia.
- Fluiditatem.
  - *Attenuantia.*
  - *Inspissantia.*
- Misturam.
  - Acrimoniam corrigentia.
    - In genere.
      - *Demulcentia.*
    - In specie.
      - *Antacida.*
      - *Antalkalina.*
      - *Antiseptica.*

Evacuantia
- *Errhina.*
- *Sialogoga.*
- *Expectorantia.*
- *Emetica.*
- *Cathartica.*
- *Diuretica.*
- *Diaphoretica.*
- *Menagoga.*

Now, without examining it minutely, it may be remarked, that the basis of this classification, the assumption that some medicines act exclusively on the solids, others on the fluids of the body, is incorrect; for, with the exception of two or three classes, the action of the

whole is on the living solids. Thus, emetics, cathartics, diuretics, diaphoretics, emmenagogues, expectorants, sialogogues, and errhines, produce their effects, unquestionably by no operation on the fluids which they evacuate, but by exciting a particular organ to action. The distinction is equally nugatory in the greater number of cases between the action of medicines on the simple solids and on the living solids. It cannot be doubted, but that tonics produce their effects in removing debility, not as the hypothesis of Cullen assumes, by any action on the inanimate fibre of the body, giving it density or tone, but by their operation on the vital powers of the system. Nor can the effects of astringents be ascribed entirely to their corrugating quality.

In this arrangement too, are placed classes of medicines which have probably no real existence, the action ascribed to them being merely hypothetical. We may be allowed to question the existence of attenuants and inspissants, —medicines which render the fluids of the body more thin, or which produce the opposite effect. Nor is there any reason to believe in the reality of antiseptics. The process of putrefaction probably never takes place in the living body; and if it did, we know of no medicines by which it could be retarded or counteracted.*

In the system of Brown, which succeeded that of Cullen, more just views were given of the relations of external agents to the living system, and of the laws regulating their action. The operations of medicines, however, are even in this system imperfectly explained principally, perhaps, from its author having surveyed all the parts of his subject with those views of generalization which nearly preclude all minute distinctions. Medicines he supposed to operate merely as other external agents, by exciting to action either the general

* That putrefaction does not take place in the living body has been most conclusively proven by a series of well conducted experiments. Vid. Seybert's Inaugural Thesis. University, Penn. 1793.

F—

system, or the particular organs on which they operate; and to differ from each other in little more than in the degree in which they exert this stimulating power. They have, farther than this, no specific properties, but are adapted to the removal of morbid affections, merely by producing excitement, partial or general, with certain degrees of rapidity or force.

This proposition is far from being just, at least in an unlimited sense. Medicines, and even external agents, in general unquestionably differ, not only in degree, but in kind of action. Every substance applied to the organs of sense, gives a different sensation, not referrable to the mere force of the impression, but which must be attributed to some essential varieties in the modes of action of the agents themselves. Every organ is excited to its usual or healthy action only by its appropriate stimulant. It is the same with regard to medicines, or differences in the kind of action they exert are not less conspicuous. Opium and mercury both excite the actions of the system, and so far agree in their general operation. But the ultimate effects they produce are extremely dissimilar, nor from either of them can we, by any variation of dose, or mode of administration, obtain those which usually result from the action of the other. All the important articles nearly of the Materia Medica, might be brought forward as similar examples, and as proving, that they are not to be regarded simply as stimulants varying in strength, but that their action is modified by peculiar powers they exert.

Still the principles of this system approach to the truth, and appear most conformable to the laws which regulate the animal economy, and, with some modifications, they may perhaps be applied so as to afford a more satisfactory view of the operations of medicines, and foundations for arranging them under different classes.

If we attend to the general operation of medicines, we find, that it is that of exciting to action, either the general system or particular organs. This is the primary effect, and to express the agency of the substance pro-

ducing it, the term of stimulant operation may be employed. And, according to the kind and degree of this stimulant operation, different effects will be produced, the discrimination of which may afford several important distinctions.

Thus, of those stimulants which act on the general system, the operation is extremely different with regard to diffusibility and permanence. Some are highly diffusible in their action, or, soon after they have been received into the stomach, they produce increased vigour, which is immediately conspicuous in the force of the circulation, the nervous system, or the different functions of the body; while, with regard to others, the same general effect is produced more slowly, and is scarcely perceptible but from their repeated or continued administration. Those which are diffusible are at the same time generally transient in their operation; while those which produce excitement more slowly, are generally more permanent. And by both diversities of action, it is obvious their operation must be productive of very different effects: the high excitement produced by the one is generally immediately followed by proportional languor; the gradual excitement from the other, being reduced more slowly, they occasion no such sudden changes, but are fitted to produce more lasting effects. These varieties of action serve, accordingly, to explain the differences in the power of some of our most important medicines, and they afford the distinction of two principal classes, Narcotics and Tonics; the one, so far as their action is understood, being apparently stimulants, diffusible and transient, the others slow and permanent.

Another important difference among stimulants, is derived from the action of some being general with regard to the system, while that of others is more peculiarly directed to particular organs. The effect with regard to either is not easily explained; but the fact is certain, that some substances, as soon as they are received into the stomach, not only produce on it a stimulant effect, but

extend this to the general system; while there are others which, without any very evident action on the stomach, and still less without any general action, excite particular organs: some, for example, stimulating the intestinal canal, others exciting the action of the secreting vessels of the kidneys, and others operating on the exhalant vessels of the skin. These, which are given as examples, afford the distinctions of cathartics, diuretics, and diaphoretics, and there are other classes founded on similar local operations. With this local action, many substances exert, at the same time, more or less of a general operation, by which the individuals of a class become capable of producing peculiar effects, and many of them, by peculiarity of administration, act specifically on more than one part of the system, by which their effects are still more diversified.

When medicines are thus determined to particular parts they are either directly conveyed, by being received into the blood, or their action is communicated indirectly from the stomach, by the medium of the nervous system; and in both ways important local effects are often produced.

Thus, there are many substances which appear to be capable of being so far assimilated with the food, as to enter into the composition of the chyle, and are received into the circulating mass. Being brought in the course of the circulation, to particular organs, they often excite in them peculiar actions. Mercury affords an example of this. It enters the circulation, and when accumulated to a sufficient extent, generally acts on the salivary glands. It is on secreting organs that these local effects are usually produced, and frequently the substance is separated with the secreted fluid, so as to be brought to act on the secreting vessels in a concentrated state. Such is the case with the alkaline salts, or with nitre, which are secreted by the vessels of the kidneys, stimulate them at the same time to action, and are capable of being detected in the secreted fluid by chemical tests.

But the most general mode in which the operation of

medicines taken into the stomach is extended, either to the system in general, or to any particular part, is by the medium of nervous communication. An impression is made on the fibres of the stomach by the substance received into it, and however difficult it may be to conceive the mode in which this can be communicated by the nerves to distant parts, the fact is undoubted, and established by the plainest evidence. It is evident from the effects of these substances being produced in a shorter time after they have been received into the stomach, than they could be were they to act by being absorbed with the chyle into the circulating mass. The stimulus of wine or of opium received into the stomach will instantly remove lassitude, and increase the vigour of the circulation, or of muscular exertion. Digitalis given to sufficient extent will very speedily reduce, to a great degree, the frequency of the pulse; or a large dose of cinchona, given half an hour before the expected recurrence of the paroxysm of an intermittent, will prevent its attack. It has also been proved by experiment, that this communication of action from the stomach to other parts, in a number of cases, does not take place where the brain and spinal marrow have been destroyed, though the heart and vascular system have been preserved uninjured.

From this susceptibility of impression, and of communicating action to other parts, the stomach becomes an organ of the first importance, since, independent of its being the vehicle by which substances are conveyed into the blood, it is that by means of which medicines are brought to act on the system by the medium of the nerves. It sometimes happens, however, that a similar extension of action may take place from other parts; and hence effects may be obtained from medicines, by applying them to the surface of the body, similar to those which they produce when they have been received into the stomach. Sometimes the effect is conveyed by nervous communication, and sometimes the substance applied is absorbed by the lymphatics, and enters the

blood. Examples of the first are to be found in many narcotics. Opium, applied to the skin, either in the solid form, or in that of tincture, often relieves pain, and removes spasmodic affections, either general or local. Tobacco applied to the region of the stomach excites vomiting; and garlic applied to the feet acts as a powerful stimulant, and raises the strength of the pulse. Examples of the second mode of operation are still more frequent. Friction on the surface is a common method of introducing mercury into the system. By the same means oxide of arsenic, tartrate of antimony, and various other active substances, may be introduced; a solution of them in water being rubbed on the palms of the hand; and in certain circumstances this is preferable to their administration by the stomach.

These are examples of the various relations which medicines bear to the living system. We are unquestionably altogether unable to assign a cause for these peculiar properties, to ascertain why the action of some should be extended to the system in general, or why that of others should be determined to particular parts, either where substances enter the blood, or where they act by the medium of the nerves. But from the possession of such properties, it is evident, that their powers as medicines must be more diversified than if they were merely general stimulants, varying in the degree of their stimulating power; and further, that distinctions are thus afforded for establishing a variety of classes.

Another cause remains to be pointed out, by which the actions of medicines are diversified. Besides acting as stimulants, they often occasion changes, either mechanical or chemical, in the state of the fluids, or of the simple solids, and these changes are productive of medicinal effects.

This operation of medicines was formerly supposed to be much more extensive than it really is. Theorists, uninformed of the laws of animal life, were not sufficiently aware of the important fact, that the actions of

medicines on the living body are governed by laws different from those which regulate the actions exerted between the masses or particles of inanimate matter. Hence we find in their speculations, constant attempts to trace the causes of diseases to changes merely mechanical or chemical, to plethora or obstruction, to laxity or rigidity, to the abundance of acid or of alkali, or to the presence of other specific acrimonies still less defined. Their explanations of the operations of medicines were of course founded on these notions, and hence the distinctions of inspissants, attenuants, antacids, antalkalies, antiseptics, and several others with which their Materia Medica was loaded.

These errors are now nearly exploded. We have learned to consider the living system as endowed with peculiar properties and modes of action, incapable of being explained on mere mechanical or chemical principles ; and to regard external powers acting upon it as producing changes conformable to these peculiar properties of life. Yet still we can sometimes refer a salutary change, effected in the system, or in particular organs, to changes mechanical or chemical in the solids or fluids. Thus, symptoms arising from irritation may be removed by lubricating the irritated surface: acid in the stomach may be corrected by the exhibition of alkalies or observant earth ; and urinary concretions may be dissolved, or at least their increase may be prevented, by the use of alkaline remedies. These properties of certain medicines are not perhaps highly important ; but still they demand attention, and they afford sufficient distinctions for the formation of several classes.

In conformity to these views, the classification of the articles of the Materia Medica, founded on their medicinal operations, may be established. It is only necessary to observe, principally to obviate hasty criticism, that in classifications founded on this principle, perfect precision is not to be expected. The science of medicine is still in so imperfect a state, particularly in what regards the relations of external agents to the living sys-

tem, that both in arranging the classes, and associating the substances which we place under each, we must frequently rest satisfied with remote analogies, which will not always bear a strict examination. This is an imperfection at present unavoidable; it must either be submitted to, or such modes of classification must be altogether rejected; and the question therefore ultimately is, not whether these arrangements are unobjectionable, but whether the advantages belonging to them are not such as to justify their adoption even with all their imperfections.*

UNDER the first divisions of the arrangement, I propose, may be placed those substances which exert a general stimulant operation on the system. Of these there are two subdivisions, the Diffusible and the Permanent: the former including the class of Narcotics, with which may be associated, as not very remote in their operation, the class of Antispasmodics; the latter com-

* The preceding account of the *modus operandi* of medicines, is on the whole, more correct than any which I have met with. Excepting indeed, that part of it which alledges that certain articles produce their effects on distant portions of the body, by being conveyed to them through the medium of the circulation, I can find little in the statement of which I do not entirely approve.

The hypothesis to which I allude, is evidently a relict of the humeral pathology. By the disciples of that sect, it was held, that disease chiefly consists in a depravation of the blood, "from too great tenuity or viscidity, by an excess of acid or alkaline acrimony, by morbific matter entering from without, or generated within, by processes analogous to fermentation or putrefaction." As a necessary consequence of this view of disease, medicines were supposed to enter the circulation, and by a sort of chemical action to correct the vitiated condition of the fluids, and hence the origin of the terms inspissants, attenuants, antacids, antalkalies, antiseptics, diluents, demulcents, &c. To demonstrate the fallacy of these speculations, by any detail of facts or reasonings, cannot now be required, as they are pretty generally exploded. My opinion is, that all changes in the condition of fluids are wrought by impressions made through the intervention of the solids. Not the slightest proof exists, so far as I know, of their undergoing any mutations either by spontaneous action, or from the introduction of foreign matters, much less that such is the cause of disease, or the mode in which our remedies operate.

To penetrate into the circulation, medicines must pass either by the lacteals or lympathics. Now, it seems more than probable, in either case, their powers would be so neutralised by the preparatory processes of animalization as to be deprived of all activity. Can it indeed be credited, that any substance, after a subjection to the digestive and assimulative powers, retains, in the slightest degree, its original properties? Experiments, on the contrary, shew, that chyle, however diversified the materials may be out of which it is formed, whether animal or vegetable, has invariably an identity of nature, and instead of being a *crude*, as is commonly imagined,

prising two classes, Tonics and Astringents. Through these there is a gradual transition from the most highly diffusible stimulant to those most slow and durable in their action.

A second division comprehends Local Stimulants,—those the action of which is determined to particular parts of the system. Such are the classes of Emetics, Cathartics, Emmenagogues, Diuretics, Diaphoretics, Expectorants, and Sialogogues; with which may be

is in reality, a highly *elaborated* fluid, having many, and perhaps all the properties of blood, except its red colour. Three of the constituent parts of blood, it at least contains.

1. There is one portion of chyle, which preserves its fluidity during life, but coagulates after death, by exposure to the air, and is probably fibrine.

2. There is a second portion, which resembles serum in continuing fluid when exposed to the atmosphere, and in coagulating at the same degree of temperature as serum.

3. There is a third, consisting of globules, similar to those of the blood, with this difference only, that they are much more minute.

The fact of the perfect and uniform constitution of chyle seems to me at once, to put down the hypothesis which I am combating. But, perhaps, it may be said it proves nothing in the case of medicines administered other ways than by the stomach, as when applied to the surface of the body, or introduced into the bowels. To this objection, the answer is obvious, and I think very satisfactory.

No one who has carefully attended to the phenomena of the absorbent system can help admitting, that every section of it is endowed with the power of *digestion* and *assimilation*, and the lymphatics quite as conspicuously as the lacteals. This capacity is given as a provision of nature, to exclude noxious matters from the circulation. The absorbents in most instances are fully adequate to this end, and where they are not, the substance penetrates to the first conglobate gland, which takes on inflammation, and arrests its further progress, these organs acting here, as centinels, guarding the exterior approaches of the body.

That some of the properties of certain articles, as the odour of garlic, and the colouring matter of madder, are displayed in the secretions and excretions, I am not disposed to deny But, it does not hence follow, that these substances entered the circulation in their primitive shape. Directly the reverse indeed seems to be proven, as neither the one nor the other can be detected in the serum of the blood.* To me it is clear, that the process of assimilation, as performed either by the chilopoietic viscera, or by any part of the absorbent apparatus, completely decomposes all substances, and however discrepant in their properties, reduces them to one homogeneous fluid, fitted for the purpose of nutrition. But when thrown into the secretions or excretions, being removed beyond the sphere of the vital energies, the

* Vid. Hodge's Inaug. Thesis, printed in the year 1801.

J. H. Forrest

associated the classes of Errhines, and of Epispastics, founded on direct local application.

The remaining classes include substances which do not operate according to laws peculiar to the living system. To one division may be referred, those, the effects of which depend on the chemical changes they produce in the fluids or solids: the classes which may be established on this principle are Refrigerants, Antacids, Lithontriptics, and Escharotics. To another division belong those, the operation of which is purely mechanical,—Anthelmintics, Demulcents, Diluents, and Emollients.

chemical affinities sometimes are again brought into play, by which, these substances are in part, or wholly regenerated.

Whether this explanation be received or not, it must, at least, be acknowledged, that no substance, in its active state, does reach the circulation, since experiments have shewn, that even a few drops of the mildest fluid, as milk or mucilage, oil or pus, cannot be injected into the blood vessels, without occasioning the most fatal consequences.

Conceding however to the humeral pathologists all which their doctrine demands, still insuperable difficulties remain in the way of its adoption to account for the operation of medicines. Not to dwell tediously on this subject, I shall content myself at present with merely mentioning that we are not at all informed by it, why our remedies after mixing with the blood should be directed to one organ in preference to another, as mercury to the salivary glands, &c.

As regards the mercurial preparations, the example particularly selected by our author to illustrate his hypothesis, there is the most conclusive proof that they, in whatever manner employed, are not carried into the circulation*, and no doubt, such is the case with all the articles of the Materia Medica. It results, therefore, from what I have said, that we are to reject the fluids altogether in our enquiries relative to the operation of medicines, because, in addition to the reasons already stated for doing so, we have, in that law of the animal economy, called sympathy or consent of parts, a solution of the problem, infinitely more consistent with the existing state of our knowledge.

Conformably to this theory, whenever a medicinal substance is applied to a susceptible portion of the body externally or internally, an action is excited, which is extended more or less, according to the diffusibility of the properties of the substance, or the degree of sympathetic connection which the part may maintain with the body generally. Thus, a set of actions is raised, every one of which is precisely similar, provided they are confined to the same system, by which is to be understood, parts of an identity of structure. If, however, the chain runs into other systems, it loses its homogeneous character, the actions being modified by the peculiar organization of the parts in which they may take place. These are principles of universal application. In every case, whether it respects the operation of remedies or the production of disease, the spot primarily acted upon is a point from which is diffused the radiated impressions.—Ed.

* Vid. experiments of Drs. Physick and Seybert, Medical Repository, Vol. V.

Under these classes may be comprehended all those substances which are capable of producing salutary changes in the human system, and which are used as remedies. A view of this classification is exhibited in the following table:

TABLE OF CLASSIFICATION.

A. GENERAL STIMULANTS.		
	a. Diffusible.	Narcotics.
		Antispasmodics.
	b. Permanent.	Tonics.
		Astringents.
B. LOCAL STIMULANTS.		Emetics.
		Cathartics.
		Emmenagogues.
		Diuretics.
		Diaphoretics.
		Expectorants.
		Sialogogues.
		Errhines.
		Epispastics.
C. CHEMICAL REMEDIES.		Refringerants.
		Antacids.
		Lithontriptics.
		Escharotics.
D. MECHANICAL REMEDIES.		Anthelmintics.
		Demulcents.
		Diluents.
		Emollients.

From this arrangement, some classes are excluded that have usually found a place in others; but these have either appeared to me not essentially different from those that are admitted, or to have been founded on false or hypothetical distinctions.

There is no great advantage in extending the arrangements into systematic subdivisions of the classes. The substances under each may follow each other according

to their natural affinities, their chemical relations, or analogies in medicinal power less important than those which form the basis of the class itself; and in the different classes one of these methods will frequently be found better adapted to any purpose of utility than the others. That which gives the most natural arrangement may therefore always be followed.

FIRST DIVISION.

OF GENERAL STIMULANTS.

THIS division, according to the preceding table of classification, includes the four classes of Narcotics, Antispasmodics, Tonics, and Astringents,—these agreeing in the general stimulant operation they exert on the system, and differing principally in the diffusibility and permanence of action. They are therefore strictly connected, at least so far as to form a series through which the transition is easily traced.

CHAPTER III.

OF NARCOTICS.

NARCOTICS, according to the definition that has usually been given, are substances which diminish the actions and powers of the system without occasioning any sensible evacuation. This definition is imperfect, in as much as it does not include that stimulant operation which they equally produce, and which in part at least must be admitted as the cause of these effects. The term Narcotic is the most unexceptionable that can be assigned to these remedies. They are also named Sedatives, from their power of diminishing action; Anodynes, from their capability of alleviating pain; and Hypnotics, or Soporifics, from their power of inducing sleep.

The following are the general effects resulting from the operation of Narcotics. In a moderate dose they in-

crease the force and frequency of the pulse, promote the secretions, give vigour to the body, and rouse the faculties of the mind, rendering its conceptions more vivid and forcible, and inducing hilarity or intoxication. These effects are however only temporary, and after some time symptoms of an opposite kind make their appearance; the pulse not only returns to its former standard, but becomes more slow, and at the same time full and soft; the respiration is more easy; the secretions, excepting that by the skin, are diminished; pain and inordinate motion, if present, are alleviated or repressed: there is a general languor, averseness to motion, and dullness of sense; the mind is placid and inactive, a state which generally soon terminates in sleep. This, after continuing for some time, is succeeded by temporary debility, marked by some degree of sickness, tremors, anxiety and oppression. If the dose has been large, these symptoms of diminished sense and action are induced, even without any previous increased action; or, if a still larger dose has been given, the immediate consequences are delirium, paralysis, convulsions, coma, and death.

These effects are considerably diversified, as arising from different Narcotics. In some, any stimulant operation is scarcely perceptible, even in a very moderate dose; others, with the narcotic power possess an acrid quality; and in a large dose, with the general effects above enumerated, induce irritation or inflammation of the stomach, by which their action is modified. Some are more apt to induce sickness than others; and there is reason to believe that there are others in which the action is not equal upon the nervous and vascular systems, but is more determined to the one than to the other.

The medicines belonging to this class evidently act primarily upon the stomach, whence their action is propagated by nervous communication to the rest of the system. That they do not act by being received into the blood is evident from the fact, that their effects are

apparent in general in a very short time, after they have been swallowed; and it has been ascertained by experiments, that if dissection be made immediately after these effects have appeared, the whole of the quantity administered is found in the stomach undissolved

Applied externally, these medicines often exert their usual action, though with much less force. Opium applied to the skin deadens pain, and represses spasmodic muscular action, not only in the part to which it is immediately applied, but in others more distant. Several others of this class have similar effects.

Narcotics applied to the muscles of animals, quicken at first their action; but in a very short time they exhaust all irratability and sensibility. The heart even of cold-blooded animals is deprived of all power of motion by the application of a strong solution of opium for a few minutes. When injected into the blood vessels, the animal instantly dies without convulsions, and all the muscles of the body, voluntary or involuntary, are totally deprived of the power of contraction.

There is a singularity in the operation of narcotics, that by repetition their action on the system is diminished more than that of any other class of medicines, so that, after having been used for some time, they require to be given in increased doses to produce their usual effects, and quantities of them have at length been taken, which at first would have destroyed life. No very satisfactory explanation has been given of this singularity, for it is not connected with any proportional reduction of irritability, or any apparent permanent change in the system; but the fact is generally true with respect to these medicines, and requires to be attended to in their administration. It appears too to be more peculiarly the case with some than with others.

The theory of the operation of narcotics is attended with considerable difficulty, and very different opinions have been maintained with regard to it.

As they in general diminish the actions of the system, when given even in a small dose, it happened, that from

their exhibition those effects were in general most obvious, and their stimulant operation was more rarely observed. Hence their primary action was generally considered as of a depressing kind, and they were described by authors under the appellation of Sedatives. The stimulant effects which were also observed to arise from their action, were ascribed to what was termed the re-action of the system. It was supposed, that there belonged to the animal frame a power, the tendency of which is to resist and obviate the effects of any thing noxious. If such an agent were applied, this principle was believed to be roused into action, and all the powers of the system were excited to throw off the noxious application. On this hypothesis, the action of narcotics was attempted to be explained by Cullen. Their natural tendency was supposed to be to depress the powers of life; if given in a large dose, this power was exerted with effect, and hence arose symptoms of exhaustion; but, if given in a smaller dose, the vis medicatrix, or preserving power, was enabled to resist, and by its resistance occasioned the symptoms of increased action that first appeared. These substances, therefore, were considered as directly sedative, and as indirectly stimulant.

Precisely the reverse of this view was advanced by Brown, narcotics being regarded as stimulants, surpassing all others in the diffusibility and little durability of their action, and on this principle their effects were explained in the following manner.

It is the necessary effect of stimulant operation, to produce for a time increased action, but as this is attended with a diminution of vital power, the excitement soon ceases, and diminished actions succeeds. These effects are proportional, partly to the absolute force of the exciting power, and partly to the rapidity with which it operates. If sufficiently strong, and if, at the same time, it be diffusible and transient in its operation, the excitement it produces is quickly raised to its highest point, and is as quickly followed by proportional

langour and diminished action. Or if the dose is large, the stimulant effect is so rapid, as to be hardly perceptible, and hence the sedative or depressing effects only appear. Thus narcotics were regarded as powerful stimulants, whose action is not confined to the part to which they are applied, but is rapidly extended over the system. In a moderate dose, they promote action of every kind, which is succeeded by a degree of languor or delibility, proportioned to the excitement that had been raised; and in a large dose, they produce diminution of power, and consequently of action, without any symptom of previous excitement. Hence they were regarded as directly stimulant and indirectly sedative.

If in investigating this subject, we merely contrast these two theories, little doubt can remain of the superiority of the latter. The former is founded on an hypothesis established by no evidence, that a power presides over the system, ready to resist every noxious application; the latter is apparently more strictly deduced from the properties of the substances whose operation is to be explained: for as it is proved, and indeed admitted, that the stimulant operation resulting from the exhibition of narcotics follows immediately, and previous to any symptoms of languor and debility, these ought strictly to be considered as the consequences of the former. The most extensive analogy too has been traced between the operation of narcotics, and other substances allowed to be stimulant, but which are less rapid in their action; as for example, between ardent spirit and opium, though in the one, the stimulant, in the other the sedative operation is usually more apparent. And lastly the advantage derived from the cautious administration of narcotics in some diseases of diminished action, is scarcely compatible with the supposition of their exerting a direct depressing power.

The principal difficulty attending the theory, appears to arise from the fact apparently established, that the sedative power of these substances does not appear to be

always proportional to their stimulant operation, but is greater than this, and that in several of them any previous stimulant effect is even scarcely perceptible. Yet this difficulty is in some measure obviated by the acknowledged fact, that substances, the stimulating action of which is unquestionable, as ardent spirit, if given in a very large dose, produce depression without any previous perceptible increased action. In like manner, electricity, applied in moderate quantity, stimulates the muscular fibre to contraction; while applied in a highly concentrated state, it instantaneously produces total exhaustion of the contractile power. The more forcibly, therefore a stimulant operates, the more rapid does the immediate action appear to be produced, and the more quickly to cease, so as to be followed by the secondary effect; and with the admission of this principle, may perhaps be explained on this hypothesis, the fact, that the sedative effects of narcotics appear often to be greater than their previous stimulating operation; the exhaustion following so rapidly, that any previous excitement is scarcely to be perceived. Narcotics, therefore, so far as we can speculate with any probability on their action, may be regarded as general diffusible stimulants.

The hypothesis may also, however, be maintained perhaps, that along with their stimulating operation, they *directly* exhaust the powers of life; and that these two modes of action are not strictly proportional, but are different in different narcotics. The effects of certain chemical agents on the system, as of nitrous oxide, and carburetted hydrogen, favour an hypothesis of this kind; the one producing high excitement without any proportional depression, the other producing exhaustion of power without any previous increased action. The truth, however, is, that from our imperfect knowledge of the laws of the living system, all such speculations are deficient in precision; nor can we do more than state the most general analogies, without attempting to extend them to any more minute applications. Thus,

in all the theories which have been advanced with regard to the operation of narcotics, the principles have been inferred from the action of a few of the most powerful,—alcohol or opium. They are after all, imperfectly adapted to these, and are still more deficient when considered in relation to the others.

As narcotics are capable of being administered, so as to obtain from their action either stimulant or sedative effects, it is obvious, that they may be employed as remedies, with the view of producing either of these. The exciting operation, however, is in general so transient, that few of them can be administered with advantage as stimulants. When given with this intention, they are applied in small doses, frequently repeated, as thus the state of excitement is best sustained. More usually they are given with the view of obtaining that state of diminished action and susceptibility to impression, which is obtained from their operation with more certainty and permanence; they are then given in larger doses at more distant intervals. As stimulants, they are employed in various forms of continued fever, remittent and intermittent fever, and numerous diseases of debility. As sedatives, they are still more extensively used to alleviate or remove spasmodic action, to allay pain and irritation, to induce sleep, and to restrain morbidly increased evacuations and secretions.

NARCOTICS.

Alcohol.
Ether.
Camphor.
Papaver Somniferum.
Hyoscyamus Niger.
Atropa Belladona.
Aconitum Napellus.
Conium Maculatum.
Digitalis Purpurea.
Nicotiana Tabacum.
Lactuca Virosa.
Datura Stramonium.
Rhododendron Chrysanthum.
Rhus Toxicodendron.
Arnica Montana.
Humulus Lupulus.
Strychnos Nu Vomica.
Prunus Lauro-Cerasus.

Alcohol. *Ardent Spirit. Spirit of Wine.*

By the process of vinous fermentation, a product is formed, which, combined in the fermented liquor, gives to its peculiar properties—pungency, spirituous flavour, and intoxicating power. Being volatile, it can be obtained by the process of distillation, and in the diluted state in which it is at first procured, forms the spiritous liquors of commerce. By repeated distillations, it is procured more pure and concentrated, and then forms what was named Pure Ardent Spirit, or Spirit of Wine, by the older chemists,—names for which that of Alcohol is substituted in modern chemical language. This substance operates on the living system as highly diffusi-

ble stimulant; in the state of spiritous and vinous liquors, it is employed for medicinal purposes; and in its pure form is an important pharmaceutic agent.

Alcohol is formed during the process of fermentation; and from the changes which occur during that process, we endeavour to infer the theory of its formation. Saccharine matter, in the state in which it exists in sweet vegetable juices, and fecula, which has been converted by malting into sugar, or even to a certain extent unmalted, are the substances chiefly susceptible of this process: the access of the air is not necessary to it; and the water of the fermenting liquor does not appear to suffer decomposition. The series of changes, whence the alcohol is formed, must arise therefore from the re-action of the elements of the saccharine matter, and the new combinations which are established. These elements are carbon, hydrogen, and oxygen; during the fermentation, carbonic acid is formed and disengaged; this must be derived from the combination of portions of the oxygen and carbon of the saccharine matter, (or of the fecula, which is of similar composition); and the alcohol, which is the only other product of the process, may, under this point of view, be considered as a compound of the remaining elements; in other words, of the hydrogen of the sugar with its remaining carbon and oxygen. This is the theory of the vinous fermentation, and of the composition of alcohol inferred by Lavoisier, from experiments undertaken with a view of investigating this subject.

More recent researches, however, have shown, that it is imperfect. Lavoisier had supposed that pure saccharine matter alone is capable of fermenting, and that the whole changes which occur during the process are changes in its composition. This is not, however, strictly true. To excite fermentation in a solution of pure sugar, a certain quantity of what is named Ferment, of which yeast is a variety, is necessary, and sweet vegetable juices suffer it only from naturally containing this ferment. Now the agency of this substance remains to be

explained, and this has not yet been done in a satisfactory manner. It appears to approach to gluten or albumen in its nature, and in particular contains nitrogen in its composition. This nitrogen, it is shown by the experiments of Thenard, disappears during the fermentation, and he has supposed it to enter into the composition of the alcohol, while a portion too of the carbon of the ferment combines with part of the oxygen of the sugar, and contributes to form the carbonic acid disengaged. The whole of this subject, however, requires to be farther elucidated.

From the analysis of alcohol, it appears to be a compound of carbon, hydrogen, and oxygen; hence, in burning, it affords merely water and carbonic acid, and the quantity of water produced exceeds even the alcohol in weight. Lavoiser inferred, that it consists of 28.5 of carbon, 7.8 of hydrogen, and 63.5 of water, without any conclusive proof, however, that this large quantity of water exists in it fully formed, and not in part at least in the state of its elements. Saussure, in decomposing alcohol, by detonating the vapour of it with oxygen gas, or by passing it through an ignited tube, discovered a little nitrogen in its composition, and has given the following as the proportions of its elements: carbon 43.65, oxygen 37.85, hydrogen 14.94, nitrogen 3.52. But with regard to the results of this analysis, it still remains altogether uncertain, what proportions of oxygen and hydrogen, exist in the composition of the alcohol as immediate principles, and what exist in it in the state of water.

The process for obtaining alcohol, consists in submitting vinous or fermented liquors to distillation. It distils over with a quantity of water, and in this manner are formed the spiritous liquors of commerce, these deriving peculiar flavour from the substances from which the fermented liquor has been prepared. These spiritous liquors, by repeated distillations, afford alcohol in a more concentrated state, different substances being added to facilitate the concentration and rectification. The process belongs to the pharmaceutical part of the work.

Pure alcohol is colourless and transparent; its odour is fragrant, and its taste highly pungent: it is lighter than water, the difference being greater, as the alcohol is more pure and concentrated, and hence the specific gravity is the best test of its strength. As prepared by the usual processes, it is of the specific gravity .835, and it is of this strength that it is ordered in the Pharmacopœias, as fit for pharmaceutical purposes. By careful rectification, however, it may be brought to .815, and even to 800; and even, when of this degree of concentration, we have no method of discovering what quantity of water is contained in it; hence we do not know what constitutes real alcohol. When of the common strength, it is so volatile, as to evaporate speedily at the common temperature of the atmosphere; it boils at 165° of Fahrenheit. It is highly inflammable, burning when in contact with the air, when its temperature is raised not much above 300°; the products of its combustion are water and carbonic acid.

Alcohol exerts chemical affinities to a number of substances. With water it combines in every proportion. It dissolves a number of saline substances, especially the pure alkalis, and several neutral salts. It likewise dissolves sulphur and phosphorous; and it is the solvent of a number of the vegetable proximate principles, such as resin, camphor, essential oil, balsam, extract, and saccharine matter.

From this solvent power, alcohol is a very important pharmaceutic agent, particularly as applied to the vegetable articles of the Materia Medica; the principles which it dissolves being those in which medicinal powers frequently reside, and being dissolved by it in such quantity as to afford very active preparations. It has another important property, that of counteracting the spontaneous changes to which vegetables are liable from the re-action of their elements; and hence these solutions retain their properties unimpaired. When diluted with an equal weight of water, it still retains its solvent power to a certain extent, added to the solvent power

of the water ; and this diluted alcohol, as it is named, is even more generally employed in pharmacy as a solvent of vegetable matter, than alcohol in its pure form. Its specific gravity, when of the due strength, is .935.

Alcohol is a powerful and highly diffusible stimulant. Taken in a moderate quantity, it almost immediately increases the force of the circulation, communicates a greater degree of muscular vigour, and excites exhilaration of mind : these gradually subside, and are followed by proportional languor. If the quantity is more considerable, its exciting effects are more quickly produced, and are followed by intoxication, temporary delirium, and stupor ; and in a large dose it occasions death, with scarcely any symptom of previous excitement. Its analogy in producing these effects to other narcotics is sufficiently obvious. Its exciting power, however, appears to be rather more permanent than that of some of the medicines of this class ; and hence, while it can be successfully employed to rouse the powers of the system, it can scarcely be used with equal advantage to repress irregular action, diminish irritation, or induce sleep.

Alcohol, in its pure state, can scarcely be said to be employed in medicine. Sometimes it is used as an application to burns, and to certain states of local inflammation not connected with increased action ; it is applied by friction to the surface to relieve muscular pains ; or to bleeding wounds to restrain hæmorrhage.

Spiritous liquors, which consist merely of diluted alcohol, are employed as general stimulants to excite the actions of the system. Their stimulant operation, however, is not sufficiently permanent or capable of being regulated, so as to avoid the injurious consequences they are liable to produce, to admit of their being employed, except as occasional remedies.

Wines and fermented liquors owe their exhilarating power probably to the portion of alcohol they contain. The opinion has been advanced indeed that the alcohol they afford by distillation does not pre-exist in them, but is formed during the distillation ; this opinion resting on the facts, that the alcohol cannot be procured

from them in the same quantity by any other method; and that when the product of the distillation is added to the residual liquor, wine is not reproduced. These facts are inconclusive; the similarity of power in vinous liquors to that of alcohol, affords perhaps sufficient reason to conclude, that it exists in them actually formed, though it may be disguised by combinations with their other principles.

The action of wine on the system, though analogous to that of alcohol, is not precisely alike; its stimulant operation appears to be less sudden and more durable; and hence it can be employed with more advantage as a tonic. It is as a tonic indeed rather than as a narcotic, that wine is administered. Its chief medicinal application is in the treatment of fevers of the typhoid type, in which it is employed to support the strength of the system, and to obviate symptoms arising from debility. With these views, it is given with more advantage than any other tonic,—a superiority derived from its stimulating power being obtained with more certainty, and being more easily regulated, from its being more grateful, and probably not requiring to be assimilated by the digestive organs to produce its effects. The quantity in which it is given is altogether dependent on the state of disease; the object to be attained is that of supporting the strength of the system until the disease has run its course; the danger to be avoided is that of giving it so largely, as to occasion any degree of exhaustion. Its administration is regulated, therefore, by the effects it produces; advantage being always derived from it, when it renders the pulse more slow and firm; when the recurrence of delirium is prevented; when irritation is lessened, and sleep induced. If the pulse is quickened, and the countenance becomes flushed: if it excite thirst, increase the heat of the body, and occasion restlessness or delirium, it is obviously injurious; and the dose must either be diminished, or its use altogether suspended. In general its operation is less powerful than it is on the system in a state of health; larger quantities therefore

can be taken, and are even required to produce any exciting effect.

In various diseases of chronic weakness, or where the strength of the system has been reduced by profuse evacuations, or by any other debilitating operation, wine is in common use as a cordial and tonic.

Different wines have effects somewhat different, according as they are possessed of astringency, or as they are sweet or acescent; and are hence adapted to answer different indications.

The wines prepared from other fruit than the grape, are less spiritous and more acescent, and are hence inferior in tonic power. Fermented liquors, especially porter, are sometimes substituted for wine, where this is necessary from idiosyncracy, and their powers are somewhat modified by their other qualities, particularly by their bitterness, and by the pungency arising from their excess of carbonic acid. Their narcotic power too is often greater than is proportioned to their vinous strength, owing to the addition of narcotic substances which they often receive in their preparation.

From the immoderate and long continued use of vinous and spiritous liquors, many diseases derive their origin; as dyspepsia, hypochondriasis, visceral obstructions, chronic inflammation of the liver, and gout,—morbid states probably arising either from the increased action it excites, giving rise to organic derangements, or from the exhaustion of power, general or local, produced by stimulant operation unnecessarily excited, or too long continued.

Ether Sulphuricus. *Sulphuric Ether.*

Alcohol suffers decomposition from the action of the more powerful acids upon it; and substances are formed by these decompositions which have a resemblance in their general properties, though, as produced by the action of the different acids, they have also peculiar powers. They are denominated Ethers. Sulphuric

ether, formed by the action of sulphuric acid on alcohol, is the one that has been chiefly applied to any medicinal purpose ; and its powers are those of a narcotic. Nitric ether, in the state in which it has been used, dilute, and with a portion of free acid, acts principally as a diuretic, and is therefore placed under that class. The other ethers are of more difficult preparation, and have scarcely been introduced into the Materia Medica.

Sulphuric ether is obtained by exposing a mixture of sulphuric acid and alcohol, in equal weights to a heat sufficient to produce ebullition ; it distils over, and is purified by a second distillation, any free acid being abstracted by an alkali. The process is considered more fully in the pharmaceutical part of the work. A diluted preparation is ordered in the pharmacopœias, in which the rectified ether is mixed with two parts of alcohol ; and in the London Pharmacopœia there is another preparation, in which a product that is obtained at the end of the distillation, of an oily appearance, ethereal oil, is added to this diluted ether : neither of these preparations is of any importance.

Sulphuric ether is colourless and transparent, highly odorous and pungent, and of a specific gravity inferior even to that of alcohol, being, when it is rectified, not more than .730, compared with the standard specific gravity of water. It is very volatile, evaporating speedily at natural temperatures ; and from its rapid transition to vapour, producing much cold during its evaporation. In vacuo it boils below the freezing point of water, and under the atmospheric pressure it boils at 98. It is also highly inflammable, and affords by its combustion water and carbonic acid. It differs from alcohol, principally in containing a larger proportion of hydrogen, and to this its greater levity and volatility are probably owing. The proportions of its elements, as assigned by Saussure, are carbon 59, oxygen 19, hydrogen 22.

Sulphuric ether is a powerful diffusible stimulant, somewhat analogous to alcohol in its action, and, like it, capable of producing intoxication. Its stimulant ope-

ration appears to be even more suddenly exerted, and to be less durable; hence its superiority as a narcotic and antispasmodic. As a stimulant, it is sometimes given in occasional doses in typhus fever, more particularly in those cases where symptoms are present, connected with spasmodic action; it is also given in other forms of fever to obviate nausea; and it is said to be useful in abating the violence of sea sickness. As an antispasmodic, it is employed in spasmodic asthma, and sometimes affords sudden and complete relief, producing for a time at least remission of the paroxism: it is also given with advantage in the hysteric paroxism; it is one of the most powerful remedies in cramp of the stomach, and singultus; and it sometimes relieves some of the symptoms of cholera, especially the vomiting. Its usual dose is a tea-spoonful, equal to about a drachm; but its beneficial effects are frequently not obtained, unless it be given in a larger dose, or until the dose has been repeated at short intervals. In dyspnœa and catarrh, its vapour inhaled into the lungs affords relief, probably from its antispasmodic power. Externally applied, it relieves muscular pains; it is an excellent application to burns; and from the degree of cold which attends its evaporation, it has been employed to favour the reduction of strangulated hernia, being dropt on the tumour, and allowed to evaporate freely.

CAMPHORA. Camphor. Laurus Camphora, Lin. *Cl. Enneandria. Ord. Monogynia. Nat. Ord. Oleraceæ Habitat, Japan, India.*

CAMPHOR is not the produce exclusively of one vegetable, but is contained in many plants, especially those of the aromatic kind, diffused through their wood or bark, and is often deposited from their essential oils when these are long kept. The oils of peppermint, thyme, sage, and a number of others, thus afford it. For the purposes of commerce, it is obtained from a species of laurel, the Laurus Camphora, a native of Japan. It exists in distinct grains in the wood of the root and branches

of this tree. It is extracted by sublimation, the wood being exposed to heat with a quantity of water, and the temperature thus communicated being sufficient to volatilize the camphor; in Europe, it is purified by a second sublimation, with the addition one-twentieth of its weight of lime.

Pure camphor is colourless, semi-transparent, tenacious, and somewhat unctious to the touch; its smell is strong and fragrant: its taste is pungent and bitter. It is volatile at every natural temperature, and soon diminishes in bulk from exposure to the air; it melts at a heat inferior to 212°; is highly inflammable; it is scarcely soluble in water, but entirely soluble in alcohol, ether, and oils essential or expressed. The alkalis do not act upon it. The acids dissolve it, and the more powerful acids decompose it. These properties are sufficient to distinguish it from the other proximate principles of vegetable. It approaches nearest in its characters to essential oil, and appears to differ from oil in chemical composition, principally in containing a larger proportion of carbon. Hence, when its volatilization is prevented, and it is subjected to a temperature so high as to decompose it, as may be done by exposing it in mixture with pure clay to a heat suddenly raised, it affords a liquid, having all the properties of an essential oil, odorous and pungent. There remains a considerable proportion of charcoal; carbonic acid, and carburetted hydrogen gases are disengaged, and an acid liquid is obtained, named camphoric acid. This acid, which is also formed from camphor by combustion, and by the action of nitric acid, has some resemblance to benzoic acid.

In a moderate dose, camphor produces effects similar to those of other narcotics, exciting first the actions of the system. This stimulant operation, however, is not considerable, even in a small dose; and in a large dose it diminishes the force of the circulation, induces sleep, and sometimes causes delirium, vertigo, convulsions, or coma.

As a stimulant, camphor has been used in typhus, cynanche maligna, confluent small-pox, and other febrile affections accompanied with debility; in retrocedent gout, and to check the progress of gangrene; but its stimulant operation is scarcely sufficiently permanent to admit of being easily regulated. As a sedative, it is used in affections of an opposite nature, as in pneumonia, rheumatism, and gonorrhœa, combined with nitre or antimonials, or by itself, where evacuations have been previously employed. In mania, it has sometimes succeeded as an anodyne: as an antispasmodic, it has been employed in asthma, chorea, and epilepsy.

The dose of camphor is from 5 to 20 grains, but it is seldom that it is given at once in so large a dose as the latter quantity, from being liable to produce nausea and irritation. In small doses, on the other hand, it produces little effect, unless these are frequently repeated. In divided doses, it may be given to the extent of a drachm or more in the day. Its power of checking the progress of gangrene has been supposed to be promoted by combination with musk, or of carbonate of ammonia: combined with opium, it forms a powerful diaphoretic; and its efficacy in inflammatory diseases is augmented by antimonials.

Camphor ought generally to be given in a state of mixture in some liquid form, as in the solid state it is very apt to excite nausea. It may be diffused in water by trituration with sugar, mucilage, or almonds. The camphorated mixture of the London Pharmacopœia, in which camphor is triturated with water, and strained, is a preparation which from the small quantity water can dissolve, can have scarcely any power. In the pharmaceutic treatment of camphor, it is necessary, in order to reduce it to powder, to add a few drops of alcohol during the trituration. Magnesia, by being triturated with it, has the effect of dividing and rendering it smooth, and may be used for its suspension; a number of the gum-resins also act on it in such a manner, that from their mixture a soft uniform mass is formed, and this

affords another mode of diffusing it in water. From this chemical action, it cannot well be combined with gum-resins in the solid form.*

Externally applied, camphor is used as an anodyne in rheumatism and muscular pains, and as a discutient in bruises and inflammatory affections; it is dissolved in alcohol or expressed oil, and applied by friction to the part. Added to collyria, or mixed with lard, it is of advantage in ophthalmia. Suspended in oil, it is used as an injection in ardor urinæ and as an enema to relieve the uneasy sensations occasioned by ascarides. The combination of it with opium is useful as a local application in toothach.

Offic. Prep.—Acid. Acetos. Camph. Emuls. Camph. Ol. Camph. Tinct. Camph. *Ph. Ed.*—Mist. Camph. Lin. Camph. Lin. Camph. Comp. Tinct. Camph. Comp. *Ph. Lond.*†

PAPAVER SOMNIFERUM. White Poppy. *Polyand. Monogyn. Rhœad. Capsula et Succus spissat. Europe, Asia.*

THE White Poppy is a native of the warmer regions of Europe and Asia; it also grows in colder climates, and without any diminution of its powers. The large capsule which it bears, affords, by incision in its cortical part, a milky juice, which by exposure to the sun and air, becomes concrete, and of a brown colour. This is named Opium, and is the production of the plant that is chiefly medicinally employed. The leaves and stalks afford by expression a juice inferior in narcotic power; the seeds are inert.

The opium of commerce is in flat or rounded masses, which when cut present a substance soft and tenacious,

* By trituration, Camphor is very soluble in milk, and in this mode it is most conveniently exhibited.—ED.

† In annexing a list of the officinal preparations of each article to its history, I place first those of the Edinburgh Pharmacopœia, and without extending it unnecessarily, by inserting the names of the corresponding preparations of the London and Dublin Pharmacopœias, I merely add those which are peculiar to either of the latter.

of a dark reddish brown colour, having a strong odour, somewhat fœtid, and a taste bitter and acrid. These are the properties of what is named Turkey opium. A kind of inferior quality is known in the shops by the name of East India Opium, which is softer, of a blackish colour, and has a fainter smell.

Though opium has been often submitted to analysis, its proximate principles are still imperfectly determined. It is highly inflammable; submitted to the action of alcohol, a considerable portion of it is dissolved; and water likewise dissolves it in part. The solution in alcohol is much more highly impregnated than that in water; and it possesses, in a much higher degree, the narcotic power. Diluted alcohol, composed of equal parts of alcohol and water, appears to dissolve all its active matter; the tincture prepared by this menstruum, when the due proportion of solvent is employed, being equal or very nearly so, in power to the quantity of opium submitted to its action. After the joint action of alcohol and water on opium, there remains, mixed with the accidental impurities, a substance plastic and glutinous, the nature of which has not been ascertained; Bucholz considering it as similar to caoutchouc, and Gren supposing it analogous to gluten; it retains no activity. By boiling in water under exposure to the air, the narcotic power of opium is impaired; this can scarcely be ascribed, however, to the dissipation of any active volatile principle; for when water is distilled from it, and condensed, it is found to have scarcely any narcotic power: it must therefore be owing to changes produced at this temperature in the principles in which the activity of the opium resides.

From these facts it is not easy to draw any precise conclusion with regard to the nature of the active matter of opium. As it is partly soluble both in water and in alcohol, and appears to suffer decomposition when boiled in water under exposure to the air, it might be concluded to be of the nature of extractive matter. On the contrary, being inflammable, and much more soluble in alcohol

than in water, it approaches more in its character to resin; yet it is not purely resinous, for its solution in pure alcohol is but slightly decomposed by water. The analysis of opium, in common with that of many of the other articles of the Materia Medica, affords sufficient proof our very imperfect knowledge of the constituent proximate principles of vegetable matter.

It has lately been stated by Dérosne, that a peculiar principle resides in opium, on which its narcotic quality depends. It is obtained by digesting water on opium, and evaporating the solution; a matter which precipitates during the evaporation, and which consists of this principle with a portion of resin and extract, is to be digested with alcohol; the resin and this principle are dissolved; and as the solution cools, the latter separates in crystalline grains, which may be purified by solution and crystallization; it is described as being in prisms, white, insipid, and inodorous: insoluble in cold water, very sparingly soluble in hot water, but dissolved by acohol, ether, and by the acids and alkalis; and possessed of narcotic power. These experiments present results so little analogous to those of former researches on the principles of opium, that they require confirmation; nor, were they confirmed, can this be properly regarded as the narcotic principle of opium, since its power, though it exists in small proportion only to the other principles, does not appear to have much exceeded that of opium itself.

The facts ascertained with regard to the action of the usual re-agents upon opium, are of importance, as pointing out its proper pharmaceutic treatment. Diluted alcohol dissolving all its active matter, is the menstruum best adapted to its preparation under the form of tincture. Water dissolving it less perfectly, can scarcely be employed with advantage. Vinegar dissolves its active matter, but has been found to impair much its narcotic power, probably by causing in it some chemical change. Wine, though it dissolves sufficiently its active principles, being liable to pass to the state of vinegar, is an improper menstruum. Any purification of opium, by

dissolving it, and evaporating the solution, only weakens its strength, and renders it uncertain; and hence this process formerly employed is now discarded from the Pharmacopœias; or at least is only retained in that of the Dublin College.

With regard to the nature of the action of opium on the living system, very different opinions have been maintained. The effects it produces appear sufficiently to establish the conclusion, that it is a powerful and highly diffusible stimulant. In a moderate dose, it increases immediately the frequency, force, and fulness of the pulse; augments the animal temperature, and gives vigour to every function of the body and mind, occasioning often intoxication and delirium. These are succeeded by diminution of the force and frequency of the pulse, by lassitude, impaired sensibility and sleep; and these again are frequently followed by sickness, headach, thirst, tremors, and other symptoms of debility. The primary operation is therefore evidently exciting; and the state of diminished susceptibility and action which follows, must be considered as the effect of this, conformable to the general law, that excitement suddenly raised is followed by exhaustion of power.

If a larger dose of opium be given, the symptoms of diminished action appear without any previous excitement, and are followed by delirium, stupor, deep and difficult breathing, convulsions and death. In this too the analogy of opium to other diffusible stimulants is sufficiently strict.

From its topical application, similar effects are produced: at first increase of pain, augmented muscular contraction, increased heat, and even inflammation, which are more or less quickly succeeded by a greater insensibility to impressions, and a greater difficulty of being excited to contraction by the application of other stimuli. The latter symptoms are also immediately induced by the application of a large quantity to the muscular fibre.

The action of opium on the system in a diseased state

is precisely analogous. In typhus and other diseases of debility, its exhibition in a moderate dose produces all the salutary effects resulting from the administration of wine and other powerful stimulants, while in diseases of an opposite nature, where there is already increased action, it is not less prejudicial.

It is to be admitted, however, with regard to opium, that its apparent sedative effects, displayed in its lessening the sensibility to external impressions, diminishing action, and inducing sleep, are greater than are proportional to the previous excitement it raises, or to an equal or greater excitement produced by other stimulants, as by alcohol. This has been accounted for from the greater diffusibility, and less durability of its primary operation; in consequence of which, the excitement it produces is soon extended over the system, and is more quickly succeeded by the secondary state of diminished power. Whether this theory of its action be satisfactory or not, and whether it be regarded as a powerful stimulant or as a direct sedative, it is to be observed, and the observation extends to analogous narcotics, that the practical application of it is nearly the same; since it is admitted that it may be exhibited so as to obtain from it stimulant and also depressing effects, and that the former are primary and are obtained from it in a moderate dose, while the latter are secondary, and are only produced by a larger dose. Although, therefore, the explanation of the mode of operation be different, there is no dispute as to the operation itself, or the effects it produces.

Opium was at one time supposed to act on the system by the medium of the blood; but experiments have sufficiently shown, that its general effects are produced when the circulation is entirely interrupted, that its action is on the living solids, and is propagated to distant parts by nervous communication.

The principal indications which opium is capable of fulfilling, are, supporting the actions of the system, allaying pain and irritation, relieving spasmodic action, inducing sleep, and checking morbidly increased evacu-

ations. It is differently administered, as it is designed to fulfil one or other of these indications. When given with the view of obtaining its stimulant operation, it ought to be administered in small doses, frequently repeated, and slowly increased, as by this mode the excitement it produces is best kept up. But where the design is to mitigate pain or irritation, or the symptoms arising from these, it ought to be given in a full dose, and at distant intervals, by which the state of diminished power and sensibility is most completely induced.

One other general rule with respect to the administration of opium, is, that it ought not to be given in any pure inflammatory affection, at least unless evacuations have been used, or unless means are employed to determine it to the surface, and produce diaphoresis.

In continued fever, not inflammatory, opium is administered sometimes as a general stimulant; but its operation being less permanent than that of wine, it is not so well adapted to obviate debility; or at least with this intention it is employed only as subsidiary to wine. It is more frequently used to diminish irritation, and lessen that state of increased susceptibility to impressions connected with debility, which frequently gives rise to restlessness, watchfulness, delirium, and spasmodic affections, particularly tremors, and subsultus tendinum. A full dose is usually given at bed-time; and to obviate these symptoms when they are urgent, it is farther occasionally administered, generally in combination with wine, in the course of the day. Its exhibition is improper, or requires to be conducted with much caution, where there is any tendency to local inflammation, or to determination to the head. If it increase delirium, it is obviously injurious.

In intermittent fever, the administration of an opiate, previous to the expected approach of the paroxysm, renders it milder, or sometimes even prevents its attack; given even during the hot stage, it lessens its violence; and administered in either mode, it facilitates the cure

by other remedies, the stimulant operation of which is less transient.*

In the phlegmasiæ, the employment of opium is from its stimulant operation more doubtful, and in any pure inflammatory affection, attended with highly increased vascular action, must be hazardous. Where it is given so as to determine its action to the surface of the body, and produce sweat, it it often advantageously employed, particularly in rheumatism; or in some of the other diseases of this order, where the inflammatory stage has subsided, its exhibition is occasionally necessary to obviate symptoms connected with irritation.

In the exanthemata, opium is employed with similar intentions, and is often more peculiarly advantageous, by lessening the irritation connected with the eruption. In small pox, it is peculiarly useful with this intention after the eruption is completed where it is copious; and if the concomitant fever be of the typhoid type, the same advantage is derived from it as in pure typhus. In measles, the state of the system being more purely inflammatory, its use is rather contra-indicated.

In hæmorrhagies, not connected with a state of highly increased vascular action, opium is a valuable remedy, by removing that state of increased irritability whence the discharge frequently arises; it is thus employed more particularly in passive menorrhagia, and in the hæmorrhage which sometimes succeeds abortion or delivery.†

* Notwithstanding the use of opium in the hot stage of intermittent fever is sanctioned by the high authority of Dr. Lind, I am altogether opposed to the practice.—My experience teaches me that it uniformly aggravates the paroxysm. As Dr. Lind practiced chiefly in warm climates where there is an habitual tendency to perspiration, perhaps the salutary effect which he ascribes to the medicine may have happened. It is hard to discredit the observations of so judicious a physician. If I were to repeat my trials with the opium, in this case, it should be in combination with antimony or ipecacuanha, in the shape of Dover's powder, which might probably induce a state of relaxation of the surface of the body favourable to the prompt solution of the paroxysm.—Ed.

† Large doses of opium in uterine hæmorrhage have recently been recommended by several distinguished writers. I have never exactly imitated this practice, but

In the greater number of the profluvia, opium is employed with the same intention, and is the remedy in several of these diseases principally relied on. In dysentery, the propriety of its administration is more doubtful, or at least it can be given with advantage only in such doses as to relieve the pain and irritation which prevail; care being taken to obviate the constipation it might produce, by the exhibition of mild purgatives.

In spasmodic and convulsive diseases, opium is obviously indicated, and in many of them is the remedy of greatest power. In chorea, it has been advantageously employed; though the dependence of this disease, on the accumulation of feculent matter in the intestines, as established by Dr. Hamilton's observations, suggests the necessity of its being employed with caution, and of its constipating effect being carefully guarded against. In epilepsy, it sometimes abates the violence of the paroxysm, especially where this is liable to recur during sleep. In tetanus, to produce any relief, it requires to be given in very large doses, and these must be frequently repeated; and even then the system is often little affected by it: when pushed, however, to a great extent, the violence of the spasmodic affection has at length been overcome, and a cure obtained. A similar remark applies to hydrophobia, in which very large quantities of opium have been given without any sensible effect on the state of the functions, but in some cases with ultimate sucess. In mania, the system is in general little susceptible to the action of any medicine; but opium, when given in sufficient doses, is frequently useful in diminishing irritation, and producing composure or sleep. In other cases it altogether fails, when given even in a very large dose, and sometimes even aggravates the restlessness and agitation of the patient. In the hys-

have often derived the greatest advantage in these cases from a union of opium and ipecacuanha in the proportion of a grain of the former to two grains of the latter, to be repeated, more or less frequently, as the circumstances of the case may require.—Ed.

teric paroxyism, opium is often employed with advantage, either introduced into the stomach, or given under the form of enema. In purely spasmodic asthma, the paroxysm is shortened, and even sometimes cut short by a full dose of an opiate. In colic, it relieves the violence of the pain; though its administration requires caution, where there is any tendency to an inflammatory state; and the constipation it is liable to produce requires also to be obviated. In cholera it is the principal remedy. In pyrosis, a moderate dose generally affords at least temporary relief; and it also frequently succeeds in checking vomiting from morbid irritability of the stomach.

In syphilis, opium is employed, principally with the intention of alleviating the irritation arising from the operation of mercury; for there is no sufficient evidence for the opinion, which has been advanced with regard to the anti-syphilitic power of opium alone. Considerable advantage is derived from its use in extensive venereal ulceration; as well as in the treatment of painful and irritable ulcers, not connected with a venereal taint. It is given too as a stimulant to check the progress of gangrene.

In many other cases of morbid affection, opium is had recourse to merely to lessen irritation, relieve pain, or induce sleep. As a palliative, it is indeed the most valuable article of the Materia Medica.

Externally applied, opium alleviates pain and spasmodic action. Applied by friction, it thus relieves the pain of cramp, and even of tetanus; and rubbed over the abdomen, it alleviates spasmodic pain of the stomach and intestines. It often relieves the pain of toothach. Applied under the form of enema, it is of singular efficacy in relieving tenesmus, and that painful affection of the prostate gland which is sometimes the consequence of the discharge in gonorrhœa having been suddenly checked; and also that irritable state of the neck of the bladder, which renders the discharge of urine

painful. It is used under the same form in diseases where it cannot be introduced into the stomach.

The dose of this narcotic is very various, according to the state of disease, and the intention with which it is administered. One grain is the medium quantity to a person unaccustomed to its use. Its power on the system soon becomes weaker; and from habitual use is so much impaired, that very large doses are required to produce its usual effects. In some diseases, too, particularly mania, tetanus and hydrophobia, it produces little sensible effect unless the dose be very large. In the last disease, it has been taken to the extent of two drachms in twelve hours, without abating the violence of the symptoms. Lastly, the operation of opium is much varied by idiosyncracy, the same dose producing very different effects on different individuals.*

By the immoderate or long continued use of opium, the vigour of the digestive organs is impaired; hence loss of appetite, wasting of the body, and muscular weakness; the nervous system, and even the functions of the mind, are also affected; the patient is distressed with uneasy sensations, which are only imperfectly relieved by other stimulants, if opium is withheld, and at length fatuity and stupor are induced.

When such a dose of opium is taken, as would prove fatal if its effects were not obviated, the symptoms are, insensibility, so that the patient cannot be roused by any exertion; a pulse usually slow and full; deep and difficult breathing, and the countenance generally somewhat flushed: this state of stupor continues sometimes

* The quantity of laudanum which has sometimes been taken would be incredible, if the fact were not attested by indisputable authority. I knew in one case, a wine-glass full of it to be given, several times in the twenty-four hours, for many months in succession, to alleviate the pain from the passage of biliary calculi.

In a case of Cancer of the uterus which was under the care of two highly respectable physicians of this city, Drs. Monges and La Roche, the quantity was gradually increased to three pints of laudanum, besides a considerable portion of opium, in the twenty-four hours.—Ed.

with occasional convulsions, until it terminate in death. The principal remedy in such a case is the immediate exhibition of an emetic, which requires to be of the most powerful kind. Sulphate of zinc, or sulphate of copper, is generally used, dissolved in water, and introduced by a flexible tube into the stomach, the former in the dose of one scruple, the latter in a dose from five to ten grains; and if vomiting is not soon induced, the dose is repeated. Along with this is employed free dilution with the vegetable acids, as vinegar, which is to be swallowed in as large draughts as the stomach can receive it. The powers of the stomach and of the general system may be roused and sustained by small doses of warm brandy; coffee has been said to have been taken with advantage, and the patient ought to be kept awake, and, if possible, in a state of gentle motion, at least for some hours.*

Opium is used either solid, or under the form of tincture, twenty-five drops of the tincture being equal to one grain of crude opium. It is employed in the solid state when we wish it to act slowly, or on the stomach and intestinal canal, otherwise it is more convenient in the liquid form. There are, besides, various preparations, in which it is either the principal ingredient, or modifies the power of others.

Officinal Preparations.—Elect. Opiat. Pil. Opiat. Pulv. Opiat. Pulv. Ipecac. cum Opio. Tinctura Opii. Tinct. Opii Ammoniatæ. Tinct. Saponis cum Opio. Troch. Glycirrhiz. cum Opio. *Pharm. Ed.*—Pil. Opii. cum Sapon. Pulv. Cornu Usti cum Opio. Tinct. Opii Camph. Vin. Opii. Emplast. Opii. *Pharm. Lond.*—Opium Purification. Extr. Opii. Syrup. Opii. *Dub.*†

* In these cases, after a short time, the pulse becomes full and febrile, accompanied by a phrenetic state of the brain. At this stage, copious blood-letting is most imperiously demanded.—Ed.

† To the above preparations may be added two others, which, under the denomiination of the *Black Drop*, are much used in the popular practice, and have acquired some reputation among the physicians of this city.

Of my own knowledge, I can say little of this medicine. I have occasionally prescribed it, and I am inclined to believe not without advantage, in cases to which

The dried capsule of the poppy is sometimes employed for medicinal purposes. Its active matter is extracted by decoction with water; this evaporated, affords an extract similar in power to opium, but weaker, or made into a syrup, by boiling with sugar, it is used as an anodyne. This syrup is a weak preparation, and is in general only given to children. One ounce of it is supposed to be equal to one grain of opium, but it is liable to be variable in strength. The dose to a child a year old is one drachm. A syrup made from opium has been supposed to be preferable, as the dose can be regulated with much more certainty, and a formula of this kind is accordingly adopted by the Dublin College; being prepared by dissolving the watery extract of opium, and forming this into a syrup, by adding the due proportion of sugar. An infusion of the capsules is used as an anodyne fomentation.

Offic. Prep.—Extr. Papav. alb. Syr. Papav. somnif. *Ed.*—Decoct. Papav. Somn. *Lond.*

laudanum did not seem to be well suited. It is however alleged by those whose experience with it is more enlarged, that it is never productive of head-ach, giddiness, nausea, and the rest of the distressing narcotic effects of opium and its ordinary preparations.

The formulæ are as follows:

1. Take of purified opium, five ounces.
——— pimento and cinnamon, two drachms.
——— saffron and orange peel, of each one drachm.
——— spirit of wine rectified, one pint.

Digest a week and strain the liquor through flannel, to which is to be added sugar candy enough to make it pleasantly sweet.

2. Take of opium, four ounces.
——— sharp vinegar or lemon juice, four pints.

Digest three weeks, and then add saffron, cloves, nutmegs, and cinnamon, of each an ounce, coarsely powdered. Continue the digestion a week longer, strain through flannel, and evaporate the liquor reduced to the consistence of syrup.

The dose of these preparations is about a half of that of laudanum, and it is the latter of them which is chiefly employed in Philadelphia. Neither the one nor the other is a new medicine, as similar receipts are to be found in the old writers.

Vid. "The Mysteries of Opium Revealed," the first edition of Quincy's Dispensatory, &c. Ed.

HYOSCYAMUS NIGER. Black Henbane. *Pentand. Monog. Solanaceæ. Herba, Semen*
Indigenous.

THE leaves of this plant, when recent, have a slightly fœtid smell, and a mucilaginous taste ; when dried, they lose both taste and smell, and their narcotic power is in part impaired. The root possesses the same qualities as the leaves, and even in a more eminent degree, but is liable to be more variable in strength. The seeds also are narcotic.

Henbane has an analogy to opium in its action more than any other narcotic, particularly in the power of inducing sleep. In a moderate dose, it increases at first the strength of the pulse, and occasions some sense of heat, which are followed by diminished sensibility and motion ; in some cases by thirst, sickness, stupor, and dimness of vision. In a large quantity, it occasions profound sleep, hard pulse, and sometimes delirium ; and in a dose which proves fatal, its operation soon terminates in coma, with a remarkable dilatation of the pupil, distortion of the countenance, a weak tremulous pulse, and eruption of petechiæ. On dissection, inflamed or gangrenous spots have been observed on the internal surface of the stomach, and the vessels on the membranes of the brain have appeared enlarged. Its baneful effects, like those of other vegetable narcotics, are best counteracted by a powerful emetic, and by drinking largely of the vegetable acids.

Henbane is one of the narcotics which has been longest known to physicians, having been employed by the ancients for mitigating pain, and restraining hæmorrhage. Störk of Vienna introduced it, and several other vegetable narcotics, to the notice of modern practitioners. He employed it in various spasmodic and painful diseases, as in epilepsy, hysteria, palpitation, headach, paralysis, mania, and scirrhus. It was given in the form of the inspissated juice of the fresh leaves, the dose of which is from one to two grains, which requires to be gradually increased. At present it is principally employed as a substitute for opium, where the latter,

from idiosyncracy, occasions any disagreeable symptom. The henbane is also free from the constipating quality of the opium. A tincture of it has been introduced into the pharmacopœias, which affords a preparation probably more uniform in strength, than the inspissated juice. Its dose is thirty drops.*

Offic. Prep.—Succ. spiss. Hyosc. N. Tinct. Hyosc. N. *Ed. Lond. Dub.*

ATROPA BELLADONNA. Deadly Nightshade. *Pentand. Monogyn. Solanaceæ. Folia. Indigenous.*

THE leaves have scarcely any smell, and only a slightly nauseous, sub-acrid taste. The berries are sweetish. Both are narcotic, as is also the root, but the leaves are preferred for medicinal use, as being more uniform in strength. In a moderate dose, belladonna occasions a sense of warmth, followed by diaphoresis, and a disposition to sleep, frequently with nausea and headach; in large dose, symptoms of intoxication, vertigo, sickness and thirst: the pulse becomes low and feeble, the pupils are dilated, vision is impaired, and these symptoms terminate in convulsions, coma, or paralysis. On dissection, where it has proved fatal, the stomach and intestines have been found inflamed, or gangrenous, and the blood in a dissolved state. The remedies are an emetic in a sufficiently large dose, and dilution with the vegetable acids.

Belladonna was first employed as an external application, in the form of fomentation, to scirrhus and cancer. It was afterwards administered internally in the same affections; and numerous cases in which it had proved successful, were given on the authority of the German practitioners. It has been recommended too, as a remedy in extensive ulceration, in paralysis, chronic rheumatism, epilepsy, mania, and hydrophobia, but with so

* The henbane is one of those plants which is cultivated in several parts of this country for medicinal purposes, and succeeds well.—ED.

little discrimination, that little reliance can be placed on the testimonies in its favour : and in modern practice, it is little employed. It appears to have a peculiar action on the eye; hence it has been used in amaurosis ; and from its power of causing dilatation of the pupil, when topically applied under the form of infusion, it has been used before performing the operation for cataract,—a practice which is hazardous, as the pupil, though much dilated by the application, instantly contracts when the instrument is introduced.* When given internally, its dose is from one to three grains of the dried leaves, or one grain of the inspissated juice.

Offic. Prep.—Succ. Spiss. Atrop. Bellad. *Ed. Lond.*

Aconitum Napellus. Aconite, Monk's-Hood, or Wolfsbane. *Polyand. Trigyn. Multisiliquæ Herba. Europe, America.*

The smell of the leaves of aconite, when recent, is narcotic, but is lost by drying. Their taste is sub-acrid. In a moderate dose its effects are those of a narcotic, accompanied with slight diaphoresis ; in a larger dose it occasions vertigo, syncope, paralysis, and convulsions.

Aconite was employed by Störk in obstinate chronic rheumatism, exostosis, paralysis, ulceration and scirrhus. Though highly praised, it has fallen almost entirely into disuse. Its dose is from one to two grains of the dried leaves ; of the inspissated juice half a grain, this dose being gradually increased.

Offic. Prep.—Succ. Spiss. Aconit. Napell. *Ed. Lond.*

Conium Maculatum. Cicuta. Hemlock. *Pentand. Digyn. Umbellatæ. Folia, Semen. Indigenous.*

This plant, which grows abundantly in this country in waste grounds, is of the umbelliferous kind. It is distinguished from other similar vegetables by its large and spotted stalk, by the dark green colour of the lower leaves, and by its peculiar faint disagreeable smell,

* This remark is not correct. There is not this tendency in the pupil to immediate contraction.—Ed.

which becomes more perceptible in the leaves when they are bruised. The seeds have a fainter odour, and are inferior in power. The root has similar powers, but varies in strength at different seasons.

Hemlock is a very powerful narcotic. Even in a moderate dose it is liable to produce sickness and vertigo; in a larger dose it occasions permanent sickness, with great anxiety, dimness of vision, delirium, convulsions and coma. The use of it was confined to external application, until it was introduced by Störk, principally as a remedy in scirrhus and cancer; and the beneficial effects obtained from it were in many cases so conspicuous, that sanguine expectations were formed of its efficacy; in cancerous ulceration in particular, the pain abates, and the discharge becomes less copious and acrid under its use, and the ulcer frequently contracts in size, and shows a disposition to heal. These effects, however, are usually only temporary, or cannot be carried beyond a certain extent; and though many cases were related by Störk and others, of permanent cures having been obtained from it, there is much reason to believe that its efficacy was exaggerated. It is now regarded only as a palliative, but, considering it even as such, it is still a valuable remedy; it relieves the pain, and corrects the discharge even more effectually sometimes, than opium, and it is not liable to occasion the disagreeable consequences which arise from that narcotic. And when opium is employed, hemlock is a valuable auxiliary, as it renders a smaller quantity necessary.

Much benefit is derived frequently from cicuta in other cases of extensive ulceration; particularly in those connected with a scrofulous taint; it promotes the operation of mercury in healing venereal ulcers; and it is useful in removing glandular obstruction and induration.

Cicuta is given either under the form of the dried leaves, or of the juice of the fresh leaves inspissated by a gentle heat to the consistence of an extract, the former being given in a dose of two or there grains, the latter

in a dose of two grains. The dose of either requires to be increased, and that more quickly, and to a greater extent, than is the case with almost any other substance in the Materia Medica, so that at length it has been taken to the extent of a number of drachms in the course of the day. The inspissated juice is a preparation on the operation of which we can never depend; hence it is seldom used; and even the powder of the dried leaves is liable to be variable in strength. Its pharmaceutic treatment, therefore, is of much importance. The leaves ought to be collected when the flowers are about falling off: they ought to be dried before a gentle fire, be reduced to powder as soon as they are dried, and kept in small phials, carefully secluded from the air and light. The proofs of their proper preparation, and of their activity, are the powder being of a lively green colour, and retaining the peculiar odour of the plant.

The recent leaves are sometimes applied externally to painful or ill-conditioned ulcers, or a cataplasm for the same purpose may be formed from the dried powder mixed with crumbs of bread.*

Offic. Prep.— Succus. Spiss. Conii Macul. *Ph. Ed. Lond. Dub.*

* The cicuta is a medicine which I have very extensively employed both in public and private practice, and I am entirely persuaded, that its powers have been much less exaggerated by Störk, than is now generally supposed. As an active remedy, it has lost its reputation I suspect, from its being commonly found in the shops in a very inert state, and perhaps still more from the small quantity in which it is exhibited. No article scarcely of the Materia Medica suffers more by keeping, or which requires, in order to attain its full effects, to have the dose so rapidly and largely increased.

Being a medicine of uncertain operation, I generally begin its use with about four grains, three times a-day, and cautiously enlarge the dose till it powerfully acts upon the system. In many cases I have often given as much as half an ounce of the powdered leaves, or recent extract, in the course of the day, and sometimes nearly double this quantity. When thus boldly employed, much advantage may be expect-

DIGITALIS PURPUREA. *Foxglove. Didynam. Angiosperm. Solanaceæ. Folia. Indigenous.*

THIS indigenous plant grows on dry elevated situations, and, from the beauty of its flowers, has often a place in our gardens. All its parts are powerfully narcotic, but the leaves being most uniform in strength, are preferred for medicinal use. They are large and oblong, of a green colour, rather dark, have little smell, and a bitter somewhat acrid taste. They are collected when the plant is in blossom, and are dried before a gentle fire, the thicker stalks being removed; and they ought to be kept without being reduced to powder.

The operation of digitalis on the system is extremely peculiar, and there is even considerable difficulty in ascertaining its real effects. In a full dose, it produces exhaustion of power, marked by a great and sudden reduction in the force of the circulation; the pulse being reduced both in frequency and force, falling sometimes from 70 to 40 or 35 beats in a minute, and being small and tremulous. This is accompanied with sickness, anxiety, vertigo, dimness of vision, and, in a large dose, with vomiting, syncope, coldness of the extremities, convulsions, and coma, with sometimes a fatal termination. Yet these effects are not uniform, but even from the same dose we observe considerable diversity of operation in different individuals: thus the pulse is sometimes rendered lower, without being diminished in fullness; at other times it is rendered irregular; nor does sickness always accompany the reduction of the force of the circulation. Sometimes none of these effects, and scarcely any perceptible change in the state of the functions are immediately apparent; but if the dose be continued, they are suddenly produced.

ed from it in all the cases enumerated above, and to which I may also add, the tic doloreux, and other anomalous affections of the nerves.

The cicuta is now cultivated in this section of the United States, and is vastly superior to that which is imported from abroad.—ED.

Effects are even observed from the operation of foxglove, apparently of a very opposite kind. While it reduces the force of the circulation, it appears to increase the action of the absorbent system, and hence proves a powerful remedy in dropsy; and Dr. Withering, by whom its powers were first particularly investigated, observed, that when given in a state of disease, it was most successful, not where there existed increased action in the system, but, on the contrary, in states of debility, where the pulse was feeble and intermitting, and the countenance pale. Other authors have remarked its stimulant operation; and Dr. Saunders, from a series of observations and experiments, has inferred, that it always acts primarily, as a stimulant, augmenting, when given in a dose not too large, the force and frequency of the pulse, and inducing a state of increased action; it is only when it is accumulated by repetition, or by too large a dose, that reduction of the force of the circulation and other symptoms of diminished power are produced; and hence, according to this view, it is strictly analogous in its operation to other narcotics.*

It must be admitted, however, that it is more difficult to regulate the administration of digitalis, so as to obtain its continued stimulant operation, than it is with regard to other stimulants; that there is a rapid transition to a state of diminished action, and that this is greater, and more permanent, compared with the primary stimulant effect, than in other stimulants even of the diffusible kind.

Foxglove, producing very different effects according to the mode in which it is administered, or according to the state of the system, is employed as a remedy in different diseases. Under the present class, those applications are to be considered, which appear to be connected with its action as a narcotic.

* Experiments made in this University, show that the primary operation of digitalis is slightly to increase the force and velocity of the circulation, which effect however is exceedingly transient, and is succeeded by exactly an opposite state of the pulse.

Vid. Dr. Moore's Inaug. Thesis, published in 1801.—Ed.

On this, in part at least, has been supposed to depend the advantage derived from it as a remedy in phthisis pulmonalis. When given to that extent in which it reduces the velocity and force of the circulation, it proves useful, by counteracting that state of increased action which prevails in the incipient stage of the disease; and by diminishing the rapidity of the circulation through the lungs, it may facilitate the removal of the local affection. In the more advanced stages, it may operate, it has been conceived, by promoting absorption, thus removing the tuberculous affection, or withdrawing the purulent matter, before it has been rendered acrid by the action of the air. Sanguine expectations have been formed of the advantages to be derived from it in the treatment of phthisis, many of the symptoms disappearing under its use, and the progress of the disease appearing to be arrested. The change of organic structure is, however, so considerable, at least in the advanced state of the disease, as scarcely to admit of a cure from the operation of any remedy; and the operation of foxglove is so much diversified, that perhaps the proper mode of administering it, has not been precisely determined, so as to admit of all the advantage being received from it that might be derived: it is difficult, as Dr. W. Hamilton has remarked, to give it so as to reduce the force of the circulation, and continue this effect without its inducing other consequences, which compel us to relinquish its use.

Foxglove has been proposed as a remedy in pneumonia, from its power of reducing the force of the circulation when given in a sufficient dose, conjoined with blood-letting; and cases have been related of the success attending the practice, while some authors have condemned it as hazardous, from the excitement it is liable to produce. On a similar principle, it has been proposed to be employed in croup.

In active hæmorrhage, it might be expected from the same operation, to be a remedy of much power; and

according to the observations of Ferriar and others, it may be employed with signal advantage in epistaxis, hæmoptysis, and menorrhagia, either alone or in combination with opium.

In spasmodic asthma, the combination of it with opium has afforded much relief. In palpitation arising from intemperance, or from passions of the mind, and not connected with dyspepsia, the irregular action of the heart has been abated, and at length entirely removed by its operation.

Foxglove is given in substance, or under the form of infusion, decoction, or tincture. The medium dose of the powder of the dried leaves is half a grain; the dose of the infusion, prepared according to the formula in the Edinburgh pharmacopœia, is half an ounce: that of the tincture is fifteen drops; these quantities being given twice a-day. The decoction is an improper form, as being variable in strength. The tincture is the form of preparation under which it has usually been given as a narcotic: the infusion, that in which it has been employed as a diuretic. Given in substance, there is supposed to be rather more risk of its effects accumulating from repetition of the dose, so as to induce the unpleasant symptoms which arise from an over dose.

To obtain the full narcotic operation of foxglove, the dose given at first requires to be gradually increased, but this increase must be made with much caution, not only from the hazard attending an over dose, but from the circumstance that the action of the remedy is for a time not apparent; but if the dose has been too large, or repeated at intervals not sufficiently distant, it appears suddenly, and continues progressive. Hence the necessity of the practitioner's watching with the greatest attention the effects it produces.* The augmentation

* This is a useful practical precept. More than once I have observed, especially in dropsical effusions, that though the digitalis was given for a succession of days, in an ample dose, it produced no sensible effect, influencing neither the arterial nor

may proceed at the rate of one fourth of the original quantity every second day, and the dose should not be repeated more than twice, or at farthest thrice a-day, unless in acute diseases, where the effect must be more speedily obtained, and where, therefore, the augmentation must be more rapid. The increase is continued until the effect intended to be obtained from the remedy is produced, or until its operation is apparent on the system; and whenever the pulse begins to diminish in frequency or force, the increase of dose must be stopt; and if the reduction be considerable, or proceed rapidly, the administration of the remedy must be suspended, and, only after a sufficient interval, cautiously renewed. This is more especially necessary when nausea is induced, dimness of vision, vertigo, or any tendency to fainting. When these symptoms do occur, they are best obviated by small doses of stimulants, warm wine, or brandy and water, with aromatics, ether, and, as some have recommended, strong bitter infusions, small doses of opium, and a blister applied to the region of the stomach.

The infusion of foxglove has been applied externally as an anodyne lotion to painful cutaneous eruptions, or ulceration. An ointment composed of the powder mixed with lard, has been found successful in obstinate tinea capitis.

The application of foxglove, as a diuretic, will be considered under the class of diuretics.

absorbent system, nor any of the functions of the animal economy, when, suddenly, there would come on an uncommon depression of pulse, and loss of general power, accompanied by the most copious urinary discharges.

Another peculiarity in the operation of our medicine, which was first noticed in the Edinburgh Medical Journal, is worthy of attention. I mean, that its action in some instances, is in no inconsiderable degree regulated by the different positions of the patient's body. In the case alluded to, the pulse was not at all reduced in frequency when the patient stood up, being in this posture upwards of an hundred: when he sat down, it fell to seventy-five, and when lying on his back, to forty in the minute.

Cases of a similar nature, though not to the same extent, have since been recorded by Drs. Hamilton, Beddoes, and other respectable writers, so as to leave no doubt of the occasional recurrence of this anomaly.—Ed.

Offic. Prep.—Infus. Digit. P. Tinct. Digit. P. *Ed. Lond. Dub.* Decoct. Digit. *Dub.*

NICOTIANA TABACUM. Tobacco. *Pentand. Monogyn. Solanaceæ. Folia. America.*

THIS plant, though sometimes cultivated in this country, is usually imported from America. Its leaves, which are of a large size, are of a light green colour, which they retain with little change when merely dried, but in the usual preparation to which they are subjected, they are rendered brown by the action of a little sulphate of iron. Their smell is fœtid, their taste extremely bitter and acrid. They deflagrate in burning, from a quantity of nitre they contain. Their active matter is extracted both by water and by alcohol; by decoction, their powers are much impaired. The essential oil obtained from them by distillation has been said to be very highly narcotic;—an assertion which has been denied, however, by some authors.

Tobacco operates as a very powerful narcotic. This is apparent, even in the common practices of smoking and chewing it, though its effects, like those of other narcotics, become less powerful from continued use. In a person unaccustomed to it, or in an over dose, it excites the most severe and permanent sickness, with vomiting, reduces the force of the circulation, and occasions extreme muscular debility, with insensibility, cold sweats, and convulsions. Taken repeatedly in small doses, it acts as a diuretic, probably by promoting absorption.

As a diffusible stimulant, the smoke of tobacco, thrown into the rectum, was at one time employed in the recovery of drowned persons, a practice unquestionably hurtful, and now exploded. The same practice is still occasionally employed in ileus and incarcerated hernia; in the former disease, with the view of removing the constricted state of the intestines; in the

latter, with the intention of producing that state of muscular relaxation which may favour the reduction of the protruded intestine. The practice, though not without hazard, has sometimes proved successful. The watery infusion of the strength of one drachm of the dried leaves to a pound of tepid water, is a more convenient form of employing it than the smoke, as an enema; and even the infusion of this strength has sometimes produced alarming symptoms of exhaustion. Unless it be used, however, in such a state of activity, as to produce some degree of muscular debility, no advantage can be derived from it; and the practice is therefore only to be had recourse to, where other methods have failed. The smoke of tobacco received into the mouth, relieves the pain of toothach, either by its narcotic power, or by exciting a profuse salivary discharge. The powder is in common use as an errhine. The infusion or decoction is sometimes used as an emetic, but its operation is extremely harsh, and accompanied with severe sickness. The medicated wine is the form under which it has been used as a diuretic, in dropsy and dysuria, its dose being 30 drops. The leaves bruised or moistened, have been employed as a local application in tinea capitis, and in various cutaneous eruptions; incautiously applied, they have sometimes occasioned the effects which arise from the internal administration of tobacco in too large a dose.*

Offic. Prep.—Vin. Nicot. Tab. *Ph. Ed.*—Infus. Nicot. Tab. *Lond.*—Tinct. Nicot. Tab. *Lond.*

* Applied to the region of the stomach, a cataplasm of the leaves of tobacco proves in some instances, very actively emetic, and is often in popular practice resorted to, where poisons have been swallowed. The same application is also sometimes made to expel worms, with what success, I cannot say. I have occasionally directed it in some cases of the more violent forms of mania, with a view of subduing the vigour and excitement of the patient, but I am not certain whether it has any superiority over the ordinary nauseating remedies.—Ed.

LACTUCA VIROSA. Strong-scented Lettuce. *Syngenes: Polygam. æqual. Compositæ. Folia. Indigenous.*

THE leaves of this plant have a strong fœtid smell, similar to opium, and yield a white juice, in which their activity resides. Their taste is bitter and acrid. Though narcotic, they have been used principally as a diuretic in dropsy, under the form of the expressed juice inspissated. The dose of this is five or ten grains, which is gradually increased to one or two drachms in twenty-four hours. By the German practitioners, by whom principally this plant has been recommended, it has also been used as a remedy in palpitation of the heart, and in intermittent fever.

Offic. Prep.—Succ. Spiss. Lact. Vir. *Ed.*

DATURA STRAMONIUM. Thorn-Apple. *Pentand. Monog. Solanaceæ. Herba. Indigenous.*

THE leaves have a narcotic odour, and a bitter taste. They possess all the powers of a narcotic, producing, when taken in too large a quantity, vertigo, sickness, delirium, and convulsions. The usual form in which it has been given, is that of the inspissated expressed juice of the leaves, the dose of which is from one to three grains twice a-day, gradually increased.*

* Doubts have been entertained by the botanists whether the stramonium is a native of the United States. Be this as it may, it now grows very abundantly in almost exery section of the country, and is known by the popular titles of Jameston weed, hen-bane, thorn-apple, stink-weed, &c. It is one of those plants which delight in a rich soil, and is most commonly to be met with on dung-hills, or other spots of great fertility.

The stramonium, in its operation on the living system, is among the most powerful articles of the Materia Medica. In all its properties, it is closely allied to the narcotic stimulants, and when largely taken, has produced tetanus, hydrophobia, and the wildest forms of mental derangement.

Every part of the plant is active ; but the preparations employed as a medicine are an inspissated juice or extract, and the dried leaves and seed powdered. Of each of these the dose is two grains, twice a-day, to be increased till it amounts to ten, fifteen, or twenty grains.

ARNICA MONTANA. Leopard's-Bane. *Syngenes. Polygam. superf. Compositæ. Flores, Radix. Germany.*

THE flowers of this plant have a smell slightly fœtid, and a penetrating bitter taste. In their action on the system, their direct stimulating power is very apparent

The stramonium was originally introduced into the practice of physic by Dr. Störk of Vienna, to whom we are indebted for our knowledge of the medicinal virtues of so many of the narcotic poisons. It was used by him in mania, epilepsy, and in the spasmodic and convulsive affections generally. As is customary in the publication of a new remedy, he ascribed very valuable powers to this article. and was soon imitated in its use by other practitioners, who confirmed by their testimony. the accuracy of his observations. More diversified trials however, with the stramonium, gradually diminished its reputation, till finally it ceased to attract any attention.

In the late revival of the medicine by the American physicians, it has been very extensively applied to the treatment of diseases, and particularly in this city. It has been freely prescribed in epilepsy, chorea, tetanus, and with very equivocal results. More good has been done with it in some maniacal cases. I have sometimes found it to answer very well as a palliative in asthma, and perhaps still better, in the advanced stages of pulmonary consumption, where the cough is violent and the respiration exceedingly impeded. The manner of using it for these purposes, is to smoke the root, previously washed, dried, and bruised, in a common tobacco-pipe.

The stramonium, I am told, has been advantageously given in palsy and rheumatism This I can readily believe; and also, that it will hereafter be discovered to be admirably adapted to a very large circle of cases. Of the diseases in which I think it promises to be of the greatest service, are some of those of the eye, as amaurosis; and, as an emmenagogue, especially in dismenorrhœa. I have, indeed, found it beneficial in painful menstruation.

Exhibited alone, or in combination with mercury, it has likewise proved in my hands a very valuable substitute for the cicuta in venereal and scrofulous ulcers of an ill condition. It corrects the state of the sore, and subdues the pain and irritability which are so frequently incident to these cases.

As an external remedy the stramonium has not been neglected. The leaves steeped in brandy are recommended as an embrocation, and when boiled in milk certainly make a fomentation, which affords much relief in rheumatic and other painful swellings.

There is an ointment formed of the stramonium which is of common use. It is prepared by boiling the bruised leaves of the plant in lard, and is employed in

along with their narcotic action; they increase the force of the vascular system, and appear to communicate tone to the muscular fibre. In a larger dose, they produce vomiting and purging, sometimes followed by muscular pains, vertigo and convulsions. Along with narcotic effects, they excite vomiting and catharsis. They have been used in amaurosis, paralysis, convulsive disorders, gout, and rheumatism. The dose is five grains in substance dried, or half a drachm in infusion.

The root of arnica is aromatic and tonic, and has been used as a substitute for Peruvian bark.

RHODODENDRON CHRYSANTHUM. Yellow-flowered Rhododendron. *Decand. Monogyn. Bicornes. Folia. Siberia.*

THE leaves of this plant are destitute of smell, but have a bitter, rough and subacrid taste, which they communicate to water by infusion or decoction. They are stimulating and narcotic, and occasion in a small dose increased vascular action; in a large dose intoxication and delirium. They have been employed principally in chronic rheumatism and gout; their power is said to be marked by a sensation of creeping in the skin and diaphoresis being induced. The form in which they have been given is decoction, 2 drachms being boiled in 10 ounces of water, and 1 or 2 ounces of the strained liquor being given twice a-day, and gradually increased.

RHUS TOXICODENDRON. Poison Oak. *Pentand. Trigyn. Dumosæ. Folia. North America.*

THIS plant has so much acrimony, that the touching of the leaves, or rubbing them on the skin, occasions itching, inflammation, and desquamation; taken internally, it excites nausea, vertigo, and pain in the head.

burns, in hæmorrhoidal tumors, in psora, and in the herpetic eruptions. In each of these cases I have witnessed its good effects, and particularly in piles, attended with much sensibility and inflammation.

For further information on this subject vid. Cooper's Inaugural Thesis, printed in 1797.—ED.

The dried leaves have been used in paralysis, in some cases related by Mr. Alderson, with marked advantage. The dose given was half a grain twice or thrice a-day in the form of bolus, and gradually increased to three or four grains daily. It excites a sense of heat, and irregular motions in the parts affected.

HUMULUS LUPULUS. *Hop. Dioecia. Pentand. Scabridæ. Indigenous.*

THIS plant is cultivated in England, being used in large quantity to give a degree of bitterness to fermented malt liquors. It is a very strong bitter, accompanied with a degree of aromatic flavour and some astringency; these are extracted by water by infusion; by decoction the aromatic flavour is lost. Along with its bitterness it has a narcotic power: of this the popular remedy, sometimes successful, of a pillow of hops to procure sleep in the delirium of fever and in mania, is a proof. It accordingly, when given internally in a full dose, reduces the frequency of the pulse and procures sleep. It has been employed as an anodyne, either in substance, in the dose of three grains, or under the form of infusion or tincture. A cataplasm or ointment prepared from it has been also used as an anodyne application to cancerous sores. It has now a place in the London pharmacopœia.

Offic. Prep.—Tinct. Humul. Extr. Humul. *Pharm. Lond.*

STRYCHNOS NUX VOMICA. Vomica Nut. *Pentand. Monogyn. Solanaceæ. East Indies.*

THE kernel of the fruit is the part of this plant that is powerfully narcotic; its taste is intensely bitter; it has little or no smell, and is so hard that it cannot be reduced into powder by beating, but requires to be filed down. Its narcotic operation is well exemplified in the effects it produces when given as a poison to dogs and other animals. It occasions extreme anxiety, paralysis of the hinder extremities, convulsions and death; and on dissection, no marks of inflammation, or local affection, are to be discovered in the stomach.

As a narcotic, it has scarcely been used, though it has been recommended in mania, epilepsy, and hysteria. It has been given in dysentery and intermittent fever, in a dose of 5 grains twice a-day; but the use of it is so hazardous, that it has not been established in practice, nor received into the pharmacopœias.

Prunus Lauro-Cerasus. Cherry-Tree Laurel. *Icosand. Monog. Pomaceæ. Folia. Europe.*

The leaves of this plant have an odour slightly fragrant; their taste is extremely bitter. They possess a highly narcotic quality, which is extracted by infusion in alcohol or water, and is even brought over by distillation in the state of an essential oil, which the water partly dissolves. And the very singular fact has been established, that the volatile principle in which the narcotic quality of this plant resides is the prussic acid. It has often been observed, that the odour of this acid is similar to that of the cherry laurel, peach blossom, and bitter almond. Bohn found, that the distilled water of the bitter almond contained prussic acid. Schroeder discovered it in the distilled water of the peach blossom and cherry laurel, prussiate of potash being obtained by distilling them from the alkali; and Bucholz succeeded in separating the prussic acid from the essential oil of the cherry laurel by agitation with an alkaline solution. This acid in its pure state has been further found to be highly narcotic; and the narcotic power of all these plants no doubt depends on it.

The distilled water of the cherry laurel has long been known as a poison to animals, and its effects are those of a pure narcotic. It has not been employed in medicine, but a cataplasm prepared from the leaves has been used as an anodyne application to painful tumors and ulcers.

CHAPTER IV.

OF ANTISPASMODICS.

It is not easy to assign precisely the differences in kind of action between Narcotics and what are named Antispasmodics. The effects they produce are similar; they are capable of exciting the actions of the system, and they are often equally powerful in allaying pain and inordinate muscular action. But they do not in general produce that state of insensibility and diminished power which follows the application of narcotics, and this constitutes the difference between these classes. This might be supposed owing to a mere difference in strength;yet there seems also to be something farther than this, since antispasmodics produce no such effect in any dose, and since, although they are so much inferior to narcotics in these effects, they are equally powerful in repressing inordinate and irregular muscular action. This difference has been explained on the supposition, that as stimulants they have less diffusibility and greater durability of action; or else, that with their stimulant operation, they have no direct power of diminishing the powers of the system. Considered under either view, they form an intermediate class between Narcotics, which are so highly diffusible, and Tonics, which are much more permanent in their stimulant operation; and experience shows, that they partake of the properties of both; several narcotics and tonics being frequently used as antispasmodics, and the powers of those which more particularly constitute the class, in obviating spasmodic affections, being apparently connected principally with their stimulant power.

From the name given to this class, their medicinal applications may be understood. Spasm is an irregular contraction of a muscle; sometimes the contraction is permanent; at other times it alternates with relaxation,

but even then are performed with more velocity, and the contractions are more powerful and more permanent than natural. Many diseases depend on spasmodic action, and others are accompanied with affections of this kind. The medicines which obviate and remove such a state are termed Antispasmodics.

Spasm may originate from various causes. One of the most frequent is a strong irritation, continually applied, such as dentition, worms, or the presence of any foreign substance in wounds. In such cases, narcotics must prove useful, by diminishing the irritability and sensibility of the system. Sometimes spasms appear to arise from mere debility, and the obvious means of removing this is by the use of tonics. Both narcotics and tonics, therefore, are occasionally useful as antispasmodics; such, for example, as opium and ether in the one class, and zinc, mercury and Peruvian bark in the other; and these are accordingly in common practice regarded as antispasmodics. But there are farther several substances which cannot be with propriety referred to either of these divisions, as musk, castor, assafœtida, galbanum, valerian, &c.; they are in some measure intermediate; and it is to these that the name of Antispasmodic is more exclusively appropriated.

Few general observations can be made on this class of medicines. As their effect is not very permanent, they require to be given during the paroxysm of the spasmodic disorder, or a short time before its approach. For the same reason, the dose requires to be frequently repeated. Those, however, which belong to the class of tonics, require an opposite mode of administration; their beneficial effects being obtained only from their continued use. Some of those more strictly antispasmodics, stimulate the general system, and render the pulse more frequent; but in general they can scarcely be regarded as medicines of much power.

ANTISPASMODICS.

Moschus.
Castoreum.
Oleum animale empyreumaticum.
Succinum, oleum and acidum succini.
Bitumen petroleum.
Carbonas ammoniæ pyro-oleosus.
Ferula assafoetida.
Bubon galbanum.
Sagapenum.
Valeriana officinalis.
Crocus sativus.
Melaleuca cajuputi.

NARCOTICS USED AS ANTISPASMODICS.

Ether.
Camphor.
Opium.

TONICS USED AS ANTISPASMODICS.

Cuprum.
Zincum.
Hydrargyrus.
Cinchona.

Moschus. Musk. Moschus moschiferus. *Cl. Mammalia. Ord. Pecora. Asia.*

The animal which affords musk, is a native of the elevated regions of the East of Asia. The musk appears to be a peculiar secretion, which is deposited in a small sac, situated nigh the umbilicus of the male. It is brought from China, or from India, in small membranous bags, covered externally with coarse hair. The musk within is in grains, is slightly unctuous, of a black colour, hav-

ing a strong durable smell, and a bitter taste. It yields part of its active matter to water, by infusion; by distillation the water is impregnated with its flavour; alcohol dissolves it, the impurities excepted.

Musk is an antispasmodic supposed to be of considerable power; it is administered occasionally in the greater number of spasmodic diseases, especially in hysteria and singultus, and also in diseases of debility. In typhus fever it is employed to relieve subsultus tendinum, and other symptoms of a spasmodic nature. In cholera, it is given with the view of checking vomiting. Combined with ammonia, it has been celebrated for its power of arresting the progress of gangrene. With regard to its efficacy in some of these affections, its virtues have been perhaps exaggerated, and from this, as well as from its high price, it is not very often employed. Its dose is from 6 to 20 grains, repeated, if necessary, every five or six hours. It is best given in the form of bolus. To children, it has been given under the form of enema, as a remedy in the convulsions arising sometimes from the irritation of dentition.

Offic. Prep.—Mist. Mosch. *Lond.*—Tinct. Mosch. *Dub.*

CASTOREUM. Castor. Castor Fiber. *Mammalia. Glires.*

THE beaver, an amphibious quadruped, is a native of the North of Europe, Asia, and America. Castor is a peculiar product collected in cells near the extremity of the rectum, in this animal. It is imported of superior quality from Russia, and an inferior kind from New England. The former is dry, slightly unctuous; of a reddish brown colour, intermixed with fibres, and covered with a tough membrane; it has a strong unpleasant smell, and a bitter acrid taste. The American castor is more shrivelled, and inferior in taste and smell. The active matter of castor is dissolved by alcohol, proof spirit, and partially by water; the tincture with alcohol is the least nauseous.

Castor is used as an antispasmodic, in hysteria principally, in a dose from 10 to 20 grains, or from 1 to 2 drachms of the tincture. From the experiments of Dr. Alexander, it appears to be a remedy of no power, as given in a quantity larger than its usual dose, it produced no sensible effect on the system.

Offic. Prep.—T. Castor. *Ph. Ed. Lond. Dub.* T. Castor. Comp. *Ed.*

Oleum Animale Empyreumaticum. Empyreumatic Animal Oil. Ol. Cornu Cervi.

The fresh bones or horns of animals, when exposed to heat in close vessels, afford an empyreumatic oil, derived from new combinations of the elements of the animal matter attached to the phosphate of lime, which is the base of bone. The oil is at first of a thick consistence, black colour, and extremely fœtid smell, but by repeated distillations becomes thinner, nearly colourless and transparent, though it remains still fœtid. In this state it has been used as an antispasmodic, in a dose of 10 or 15 drops. It retains its place in the Dublin pharmacopœia, under the name of Oleum Cornu Corvini Rectificatum, being obtained in the distillation of hartshorn or bones, for the preparation of carbonate of ammonia; but it is entirely discarded from practice.

Succinum. Oleum et Acidum Succini.

The bituminous substance, amber, though it has a place in the list of the Materia Medica of the different pharmacopœias, is perfectly inert, and is introduced only as affording, by distillation, an empyreumatic oil, which has been applied to some medicinal uses. This oil is at first thick and of a dark brown colour; but by repeated distillations with water it becomes limpid, still retaining however a very fœtid odour. It has been celebrated for its antispasmodic power, and has been employed in hysteria and amenorrhœa in a dose from 10 to 15 drops. It is now discarded

from practice, or is used only occasionally as an external stimulating application in paralysis and chronic rheumatism.

Along with this oil, a peculiar concrete acid is produced in the distillation, which is at first impure, but is purified by sublimation, or by solution and crystallization. It has a place in the Edinburgh and Dublin pharmacopœias, but appears destitute of any medicinal power, and is never applied to any use.

BITUMEN PETROLEUM. PETROLEUM BARBADENSE. MINERAL TAR.

VARIOUS kinds of liquid bitumens exist as natural productions, of different degrees of thickness, of a colour more or less deep, and also more or less volatile. That which has been usually kept in the shops, and applied to any medicinal use, under the name of Barbadoes Tar, is thick, of a dark brown colour, having a smell that is fœtid, and a warm bitter taste. It has an analogy to the preceding empyreumatic oils in its properties; it has been used as an antispasmodic and sudorific, and externally as a stimulating application in paralysis. Though it retains its place in the pharmacopœias, it is scarcely ever used.

CARBONAS AMMONIÆ PYRO-OLEOSUS. Empyreumatic Carbonate of Ammonia. Sal Cornu Cervi.

THE bones of animals, when exposed to a sufficient degree of heat, afford a large quantity of carbonate of ammonia, formed by new combinations of the elements of the animal matter contained in the bone. There is a similar production of empyreumatic oil, and with this oil the ammoniacal carbonate is always impregnated, whence it derives a peculiar fœtid odour. It has also been supposed to derive from it certain medicinal powers, and has been used in preference to the pure carbonate of ammonia as an antispasmodic. Having been first procured from the bones of the deer, it has retained the name of Sal Cornu Cervi, and it still retains its place in the Dublin pharmacopœia; being

procured dissolved in the water which distils over, and this being rectified by repeated distillations. When thus rectified, it differs in little from pure carbonate of ammonia; and even combined with the empyreumatic oil, it has probably no additional medicinal efficacy, while from its fœtor it is unpleasant. Pure ammonia, dissolved in alcohol, is used as a solvent of the active matter of castor, assafœtida, and other antispasmodics, on the supposition that it coincides with them in their action on the system.

Ferula Assafoetida. Assafœtida. *Pentand. Digyn. Umbellatæ. Gummi-Resina. Persia.*

Assafoetida is a concrete gum-resin, obtained by exudation from incisions in the roots of the plant; the juice, after it exudes, being hardened by exposure to the sun. It is in small masses, adhering to each other, of a variegated texture, yellow on the external surface, white within, having an extremely fœtid smell, and a taste bitter and subacrid. It consists of about two thirds of gum, and one third of resin, its taste and smell residing in the resinous part. It yields all its virtues to alcohol. Triturated with water, it forms a milky-like mixture, the resin being diffused by the medium of the gum. Distilled with water, it affords a small quantity of essential oil, extremely fœtid.

Assafœtida is used as an antispasmodic in different nervous diseases, especially in hysteria, dyspnœa, dyspepsia attended with flatulence, and tympanitis, and is superior in efficacy to any of the fœtid gums. Its usual dose is from 5 to 20 grains, in the form of pill, or diffused in water. It is likewise given under the form of enema, in tympanitis, flatulent colic, in the violent hysteric paroxysm, and as a remedy against worms, 2 drachms being diffused in 8 ounces of warm milk or water; it is sometimes applied externally as a plaster.*

* The watery solution of assafœtida is one of the best remedies in pertussis. Its use however, should always be preceded by emetics, or by pretty active purging with calomel.—Ed.

Offic. Prep.—Alcohol Ammon. Fœtid. Emp. Assafœt. Pil. Assafœt. Comp. Tinct. Assafœt. *Ed.*—Mist. Assafœt. *Lond. Dub.* Enem. Fœtid. *Dub.*

Bubon Galbanum. Galbanum. *Pentand. Digyn. Umbellatæ. Gummi-Resina. Africa.*

Galbanum is obtained in the form of a milky juice, by exudation from incisions in the stem of the plant; when hardened it is in the form of a mass somewhat variegated in its texture, tenacious, of a yellowish brown colour, having a fœtid smell, and a bitter acrid taste.

Alcohol dissolves its resin, in which its powers have been supposed to reside; proof spirit dissolves it entirely, the impurities excepted. Triturated with water, it is diffused, and forms a milky-like fluid; by distillation it affords about one twentieth of its weight of essential oil.

Galbanum has the virtues of the fœtid gums, and is used for the same purposes; but being inferior in strength to assafœtida, it is less employed. Its dose is ten grains. Externally, it is more frequently used as a discutient to indolent tumors, and as a stimulant to promote suppuration.

Offic. Prep.—Pil. Galb. Comp. *Lond.*—Tinct. Galban. *Dub.*—Emp. Galb. Comp. *Lond. Dub.*

Sagapenum. *Gummi-Resina.*

This gum-resin, usually imported from Alexandria, is the produce of an unknown tree said to be a native of Persia. It is in small masses, of a yellow colour, having a smell slightly fœtid, and a pungent nauseous taste; it is soluble in proof-spirit; by distillation it affords a small quantity of essential oil.

Its virtues and uses are the same as those of assafœtida, to which, however, it is much inferior in power, and is therefore seldom employed. Its dose is from ten to twenty grains. It is sometimes applied externally as a discutient.

Valeriana Officinalis. Wild Valerian. *Triand. Monogyn. Aggregatæ. Radix. Indigenous.*

The root of this plant, which is the part used in medicine, consists of a number of slender fibres twisted, and attached to one head, of a light brown colour, having a smell strong and unpleasant, and a warm bitter taste. Its active matter is dissolved equally by water and alcohol, and appears therefore to consist of extractive matter, with perhaps a small portion of tannin, as its infusion changes colour on the addition of sulphate of iron. By distillation, water is impregnated with its flavour, but not with its taste, and no sensible quantity of essential oil is obtained.

Valerian is one of the principal modern antispasmodics, and is employed in hysteria, chorea, and epilepsy, where these depend not on organic derangement, or on any permanent irritation, but on increased susceptibility of the nervous system. Sometimes also, it is used with advantage in hemicrania. Its dose is from one scruple to one drachm, three or four times a-day, which is increased gradually as far as the stomach can bear it. Sometimes it is taken under the form of infusion.

Offic. Prep.—Tinct. Valer. Tinct. Valer. Ammon. *Ph. Lond.* et *Dub.*—Extr. Valer. Infus. Valer. *Dub.*

Crocus Sativus. Saffron. *Triand. Monogyn. Liliaceæ. Floris Stigmata. Indigenous.*

This substance is composed of the stigmata which crown the pistil of the flower. These are pressed together, and form a soft mass of intermixed fibres, named Cake saffron; when dried separately, they form Flower Saffron. The former is what is usually kept in the shops. It is somewhat moist, of a deep reddish yellow colour, its flavour is aromatic and diffusive, the taste warm and bitterish. The active matter is equally extracted by alcohol, water, proof spirit, and vinegar; the residuum, which is not more than six parts out of sixteen, being inert ligneous fibre. By distillation with water, a small quantity of essential oil is obtained.

Saffron was formerly regarded as a very active medicine, possessed of high stimulant and antispasmodic power, and requiring, it was imagined, to be given with much caution. Experience has proved it to be nearly inert, and it is now banished from medical practice. It is used as a popular remedy in the exanthemata, particularly in small pox.

Offic. Prep.—Tinct. Croci. *Ed. Dub.*—Syr. Croci. *Lond.*

MELALEUCA CAJUPUTI. *Polyadelph. Polyand. Hesperideæ. Oleum Volatile. Ol. Cajeputæ. Cajeput Oil. India.*

THE essential oil, known by the name of Cajuput Oil, was supposed to be obtained from the Melaleuca Leucadendron ; but, from later investigation, it appears to be procured from another species, to which the name of Melaleuca Cajuputi has been given. It is obtained by distillation from the leaves and fruit, has a green or yellowish colour, a strong fragrant odour, somewhat similar to that of camphor, and an extremely pungent taste. It is highly volatile and inflammable.

This oil has been used as a highly diffusible stimulant and antispasmodic, in tympanitis, flatulent colic, hysteria, palsy, chronic rheumatism, and various other diseases of debility. Its dose is three or four drops. It is also applied externally to relieve rheumatic and gouty pains, and it often succeeds in relieving the pain of toothach, when applied to the affected tooth.

Several substances are employed as antispasmodics, and which I have therefore placed in the table, which more strictly belong, however, to some of the other classes. Under these, therefore, their history is given, including the notice of those few applications of them as remedies, connected with their antispasmodic power.

CHAPTER V.

OF TONICS.

By Tonics, are understood those substances, the primary operation of which is to give strength to the system. It has been conceived that muscular vigour depends on a certain degree of tension, or tone as it is termed, of the muscular fibre; and those substances which renew that vigour when impaired, have been considered as restoring this due degree of tension, and have thus received the appellation of Tonics. They are not, however, to be considered as acting by producing any mechanical change in the state of the solids, as this opinion implies. They act upon the living principle, and, so far as their action is understood, are stimulants of considerable power, permanent in their operation.

The distinction has been already pointed out between stimulants, which is founded not so much on a difference in their power, as in the quickness with which their full effect is produced, and in the transient nature of that effect. If a medicine suddenly raises a high state of excitement, this is as quickly followed by a proportional langour or debility, and the changes from both modes of action, in the state of the functions of the body are sufficiently evident. But, if the stimulant operation be more slowly exerted, any change is much less conspicuous, and the succeeding collapse takes place to no considerable extent; but even when the administration of the remedy is suspended, the effect is merely a gradual abatement of excitement, counteracted even by the action of the stimulants habitually applied. On these principles the action of tonics is to be explained. It is only by their stimulant operation that they can obviate debility; and as their effect is gradual, their action is not followed by that exhaustion and diminished susceptibility which invariably follows from excitement suddenly

raised. If their administration, however, be carried to excess, or be continued too long, it may at length diminish the powers of the system; and if employed in a state of health, or high vigour, their effects may be injurious.

Tonics act primarily on the stomach, the action they excite in that organ being conveyed generally by nervous communication to the rest of the system. This is evident, from their effects often taking place in a short time; and there are experiments which prove, that when some tonics, as Peruvian bark, have been taken for a considerable length of time, no portion of them can be discovered by any chemical test in the blood. There are some of them, however, especially in the metallic tonics, which are received into the circulation.

The stimulating effect of tonics is principally to be observed from their continued administration; they increase gradually the force of the circulation, promote the action of the digestive organs, augment the secretions, or moderate them when they have been morbidly increased, and give vigour to the muscular system. From the action of some of the more powerful remedies of this class, these effects are apparent, even in a short time. The diseases in which they are employed, must be obviously those of diminished power.

Tonics may be subdivided into those derived from the mineral, and those from the vegetable kingdoms: the former division comprehends several of the metals, and one or two of the earths. Under the vegetable tonics are comprised a number of substances possessing bitterness, and an aromatic pungency. These two qualities are generally blended in the most powerful tonics belonging to the vegetable kingdom; and there is a transition from these to the more pure bitters and aromatics. The stimulating action of the latter is rather too local and transient to give rise to much permanent tonic effect; yet they can scarcely be placed under any other class, and I have therefore associated them with the substances with which they are thus connected.

TONICS.

FROM THE MINERAL KINGDOM.

Argentum.
Hydrargyrum.
Ferrum.
Zincum.
Cuprum.
Arsenicum.
Bismuthum.
Barytes.
Calx.
Acidum nitricum.
Oxy-murias potassæ.

FROM THE VEGETABLE KINGDOM.

Cinchona officinalis.
Cinchona caribæa.
Cinchona floribunda.
Aristolochia serpentaria.
Dorstenia contrayerva.
Croton eleutheria.
Cusparia febrifuga.
Swietenia febrifuga.
Swietenia mahagoni.
Colomba.
Quassia simarouba.
Quassia excelsa.
Gentiana lutea.
Anthemis nobilis.
Citrus aurantium.
Citrus medica.
Laurus cinnamomum.
Laurus cassia.
Canella alba.
Myristica moschata.
Caryophyllus aromaticus.
Capsicum annuum.
Piper nigrum.
Piper longum.
Myrtus pimenta.
Amomum zingiber.
Amomum zedoaria.
Amomum repens.
Carum carui.
Coriandrum sativum.
Pimpinella anisum.
Mentha piperita.

TONICS FROM THE MINERAL KINGDOM.

These are in general more local in their action than the vegetable tonics; they either operate more directly on the stomach without their action being so quickly extended to the whole system, or they act by being received into the circulating mass. Hence they produce less immediate general excitement, and it is only from their continued administration, generally in small doses, that their tonic effect is obtained. The analogies from which I have placed together the substances associated under this division, are perhaps somewhat remote and imperfect; and to some of them, the appellation of tonic may be considered as applied by rather too free an extension of the term. But such imperfections in the classification of substances, from their action on the living system, are in the present state of medical science unavoidable to a certain extent. The substances with regard to which this objection may be urged in the present case, could scarcely be referred with propriety to any other class: affinities may be traced in their operation, sufficient to connect them by their medicinal effects; and even considered individually, the claim of each may be established to a certain degree of tonic power.

Argentum. Silver.

This metal is distinguished by its pure white colour, its high degree of lustre, and its great ductility and malleability. It is not very susceptible of oxidation; it does not suffer that change from exposure, even in a state of fusion, to the atmosphere. Those acids which yield oxygen readily oxidate and dissolve it, particularly nitric acid, which is hence employed as its usual solvent. The solution, when evaporated, affords the nitrate of silver in a crystalline form.

It appears that nitrate of silver was sometimes employed by the older physicians, but the harshness and

violence of its operation led to its disuse. More lately, it has been introduced as a remedy in epilepsy,—a disease which, when not depending on organic derangement, is frequently connected with morbid susceptibility, and which tonics sometimes remove. The advantage derived from the administration of nitrate of silver has been established on the testimony of Dr. Sims, Dr. Cappe, Dr. Bostock, and others. The dose is a quarter of a grain of the crystallized nitrate, which may be given three or four times a-day. Distilled water must be employed to dissolve it, as spring water would decompose it; and the solution may be made into pills with bread. It sometimes acts as a cathartic, and if it occasion much cathartic effect with griping, or excite nausea, the dose must be diminished. Dr. Cappe has related a case of Angina Pectoris, the symptoms of which were removed by a similar administration of nitrate of silver.*

HYDRARGYRUM. HYDRARGYRUS. ARGENTUM VIVUM MERCURIUS. Mercury or Quicksilver.

It has not been usual, in arrangements of the articles of the Materia Medica from their medicinal power, to place mercury under the class of tonics, but rather under that of sialagogues. Its power, however, of exciting the salivary discharge, is merely a secondary effect, not constant nor uniform, and which is not essential to its efficacy in any disease. On the contrary, its tonic power

* In this city, nitrate of silver has been sufficiently tried in epilepsy, and not with much success.

If it be admitted to palliate symptoms or in some instances to protract the return of the paroxysms of this disease, I suspect this is all which could be said of its efficacy. More I am inclined to believe has been done with it in chorea

Do we not do injustice to the remedy by administering it in too small doses? By Dr. Powel, a distinguished practitioner of London, who is said to employ it with signal advantages in most of the cases of neuroses, from two to five grains are given every six hours. In one case of epilepsy I gradually augmented the dose to eighteen grains in the twenty-four hours without producing any troublesome effect. It did not however cure the disease.—ED.

is its primary operation; it is the most general stimulant belonging to the Materia Medica, pervading every part of the system; acting, as Cullen has remarked, as a stimulus to every sensible and moving fibre of the body, and producing the most permanent effects. Hence, it is the most general evacuant we possess; and from its stimulant operation, exerted directly or indirectly, we are able to explain its utility in many diseases.

This metal is peculiarly distinguished by its fluidity at all natural temperatures, with the exception of the intense cold that sometimes prevails in very northern regions. Its congealing point is —40° of Fahrenheit. In its liquid state, it has the perfect opacity and lustre characteristic of metals, and likewise the property of great density, its specific gravity being to that of water as 13.5 to 1 nearly: it boils at a temperature a little above 600°, and when boiling suffers oxidation from the action of the atmospheric air. It is oxidated even at natural temperatures, when subjected to agitation; or still more easily, when triturated with any viscid matter, which is interposed between its globules, extending their surface.

Quicksilver is usually obtained from the ore in which it is combined with sulphur, this being submitted to heat mixed with iron or lime, either of which combines with the sulphur, and the mercury is obtained by distillation. The quicksilver of commerce is sometimes impure, or adulterated by the intermixture of other metals, particularly lead and bismuth. This may be suspected when the metal loses its lustre speedily, and is covered with a gray film, or from its diminished mobility, in consequence of which its globules do not preserve exactly the spherical form, nor unite easily with each other; and it may be discovered, with more certainty, by exposing it to a heat sufficient to volatilize the quicksilver, when any other metal present will remain. It is best purified by distillation from iron filings in an iron retort.

Mercury is not, in its metallic state, applied to any

medicinal use ; but under various forms of preparation, it is extensively employed, and affords a series of very active remedies.

When rendered active on the system by any of the modes of preparation to which it is subjected, it operates as a very powerful and general stimulant, as from being received into the blood, it is enabled to act on every part of the system.* Hence when given in moderate quantity, it communicates general vigour : it increases the force of the circulation when this has been languid ; by the increased vascular action which it excites, it gives to the blood the disposition to assume the buffy coat ; and by its stimulant operation on secreting organs, it promotes the secretions, and hence is the most general evacuant we have. On its general stimulant operation probably depends its efficacy in diseases connected with spasmodic action, as tetanus and hodrophobia ; and perhaps also that derived from it in various forms of fever, particularly the remittent fever of warm climates, and yellow fever : and its local operation is distinctly marked in the advantage derived from it in chronic hepatitis, and other varieties of visceral and glandular obstructions, and in the different species of cutaneous eruptions.

Its most important medicinal operation, however, is that displayed in removing the disease induced by the syphilitic poison. In this, its power is nearly, if not altogether specific ; no article of the Materia Medica could be substituted for it ; and there may be affirmed of it, what cannot with equal justice be said of any remedy employed in the treatment of any other morbid affection, that if duly administered, it will scarcely ever fail in effecting a cure. It is difficult to assign any satisfactory theory of its operation. Its efficacy has been ascribed to its general evacuant power, in consequence

* It is not true, that mercury is taken into the circulation, as I have endeavoured to show, in the former part of this volume, under the head of modus operandi of medicines.—Ed.

of which the syphilitic virus is discharged from the body. But the speedy disappearance of the local symptoms of syphilis under its use, affords a proof that it operates on some other principle; no similar advantage is derived from other evacuants; and its efficacy is not proportional to the evacuation it excites, but is frequently displayed where this is altogether insensible. The opinion has been advanced, that it acts an an antidote to the venereal virus, neutralizing it somewhat in the manner in which one chemical agent subdues the properties of another, an opinion extremely vague and hypothetical, and rendered improbable from the consideration of the very small quantity of some of the more active preparations of mercury, from which a cure may be obtained, compared with the large quantity of others less active, that requires to be administered. The explanation advanced by Mr. Hunter, that the efficacy of mercury in the treatment of syphilis depends on its general and permanent stimulant operation on the system, by which it induces and keeps up an action incompatible with that morbid action which constitutes the disease, until the virus is destroyed by the chemical changes going on in the system, or until it is eliminated from the body by the usual excretion, is on the whole most probable; it rests on a principle undoubted, that there are states of morbid action incompatible, so that one suspends the action of the other; and mercury does exert a very general action, inducing and keeping up what may be regarded as a morbid state.

The mode of administering mercury, for the cure of the venereal disease, under all its forms, is now ascertained with sufficient precision. There is no advantage in giving it so as to induce profuse salivation, this is even to be avoided as hurtful; at the same time it is proper that salivation should be excited to a certain extent, not probably as essential to its efficacy, but as a proof of its full action on the system being obtained. This is kept up for a certain time, longer or shorter, according to the state of the symptoms, and the previous

continuance of the disease. Exposure to cold is avoided, as being liable to cause the more partial operation of mercury on the salivary glands; and the state of irritation is diminished, or determination to the intestines producing purging is obviated, by the exhibition of an opiate. When profuse salivation occurs, the remedies employed to check it are cathartics in moderate doses, small doses of opium, the application of a blister to the throat, and the administration of sulphuret of potash; the last being employed from the doubtful hypothesis, that its chemical agency may neutralize the mercury. Free exposure to a cool dry air is, according to the observation of Mr. Pearson, more effectual than any other method. When the morbid irritation, from the action of mercury rises too high, producing a state of exhaustion, which sometimes proceeds rapidly to an alarming extent, the administration of the remedy must be immediately suspended; and in this case also, exposure to a cool atmosphere is advantageous.*

The preparations of mercury, medicinally employed, are those in which it is oxidized, in which the oxidized metal is combined with an acid, or in which either the metal or the oxides of it are combined with sulphur.

The gray oxide formed by the trituration of mercury, is the basis of a number of preparations. In these, the metal has been supposed indeed to be merely mechani-

* There is nothing more desiderated in the practice of physic than a remedy to check the inordinate action of mercury. Cathartics, so far from answering this purpose, have invariably a contrary effect. I do not know, indeed, so certain a mode of developing the mercurial action as by copious purging. In all cases where I meet with any difficulty of exciting salivation, I resort to this method, and commonly with success. The more active the purge the better.

We have no specific means of controlling the mercurial impression. The free use of opium to subdue irritation, a generous diet, and an exposure to fresh, though a *dry* air, I have found the most beneficial plan of treatment.

To alleviate the local distress, any of the ordinary gargles are useful, and where much swelling and inflammation exist, a blister should be applied around the throat. —Ed.

cally divided; but in its metallic state, mercury does not appear to exert any sensible action on the living system and the activity of it in these preparations is a proof that it is oxidated. This is established more directly; quicksilver, by agitation, being converted into a black powder, which is soluble in muriatic acid, which metallic mercury is not.

This oxidation is facilitated by the quicksilver being triturated with any viscous substance which facilitates the division of its globules. By trituration with mucilage of gum arabic, a preparation is obtained, named Plenk's Mercurial Solution, the operation of which is extremely mild. Rubbed with chalk, it forms the Hydrargus cum Creta of the London pharmacopœia, a preparation having nothing to recommend it. The Mercurial Pill is, of all the preparations adapted to affect the general system, the one most commonly employed, and is perhaps equal to any other, having the advantage of not being liable to produce much irritation, while we can depend on the certainty and permanence of its action. It is prepared by triturating quicksilver with conserve of roses, and adding a sufficient quantity of starch to form a pill mass. In a dose of eight grains, morning and evening, it soon affects the general system; in a larger dose, it is liable to occasion purging. Triturated with lard, quicksilver soon loses its metallic form; and the ointment, after it has been kept for some time, contains little metallic matter, the unctuous matter probably promoting the oxidation. The oxide is diffused through the lard, and it has been conjectured, is in part too combined with sebacic acid, formed from the oxygenation of the fat. Rubbed on the skin, in the quantity of one drachm of the strongest ointment, (that composed of equal parts of quicksilver and lard,) it is forced through the cuticle, and is taken up by the absorbents; the system is thus affected, without the unpleasant consequences of nausea and purging, sometimes occasioned by the internal administration of even the mildest mercurial preparation; this method is employed,

therefore, where, from the state of the system, these affections are liable to be produced. Where it is necessary too to give the remedy in a large dose, or to bring the system speedily under its action, mercurial friction is employed, along with the administration of some of the mercurial preparations by the mouth. And, lastly, it has been supposed, that in certain local affections, particularly bubo, some advantage is derived from the mercury being conveyed through the affected gland.

The Mercurial Plaster is the metal triturated with melted resin and oil, and mixed with litharge plaster: it is sometimes applied to indolent glandular tumors as a discutient. Its power is supposed to be increased by the addition of gum-ammoniac, and this compound plaster has a place in the London and Dublin pharmacopœias.

Mercury oxidated by exposure to atmospheric air, at a high temperature, gives an oxide in scales of a red colour, containing about seven of oxygen in one hundred parts. This, the red oxide, (Oxidum Hydrargyri Rubrum of the London pharmacopœia,) affords a preparation, supposed by some to be the most uniform in its strength, and most certain in its operation, of all the mercurials. Its dose is one grain night and morning. It is more active than the gray oxide, but is more liable to produce irritation.

Various preparations are obtained from the metal oxidated by the acids. The nitrate of mercury decomposed by heat, furnishes what is named Oxidum Hydrargyri Rubrum per Acidum Nitricum by the Edinburgh College, Hydrargyri Nitrico-Oxydum by the London. It is probably not an oxide, but a sub-nitrate, and, from the acid combined with it, is derived its escharotic power, for which only it is employed, being applied externally to change the diseased surface of ulcers, or to other purposes for which escharotics are used.

When the nitrate of mercury, containing the mercury in a low state of oxidation, is decomposed by ammonia, a precipitate is thrown down of a gray colour, which

appears to be nearly a pure oxide. It is the Oxidum Hydrargyri Cinereum of the pharmacopœias; is comparatively mild in its operation, and is frequently employed, its dose being one or two grains. It is also sometimes used under the form of ointment, as a mode of applying mercurial friction.

Mercury, oxidated by sulphuric acid, forms the sulphate of mercury, which, decomposed by the affusion of boiling water, affords a yellow powder, the Sub-sulphate, or as it was formerly named, Turbith Mineral. This acts with too much violence to be used as a mercurial. In a dose of three or four grains, it acts as a powerful emetic, and it is sometimes used as an errhine.

The preparations in which the mercury is saturated with an acid, are very active. The nitrous solution of it is highly caustic. Mixed with lard it forms an ointment, Unguentum Nitratis Hydrargyri, used with much advantage in cutaneous diseases.

Mercury, oxidated and combined with muriatic acid, forms two very active preparations, differing in the degree of oxidation, and in the proportion of acid with which the oxide is combined. The one has been long known by the name of Corrosive Sublimate of Mercury, the other by that of Mild Sublimate or Calomel. The former is now named Muriate of Quicksilver by the Edinburgh College, and Oxymuriate of Quicksilver by the London College; the latter by both Colleges, Submuriate of Mercury;—names not sufficiently distinctive, and chemically incorrect. The old distinguishing epithets are still the least ambiguous, and even as a chemical nomenclature are properly used.

The first of these, Corrosive Muriate of Mercury, is composed of the metal highly oxidated, and the oxide is combined with a large proportion of muriatic acid. The proportions are 69.6 mercury, 12.3 oxygen, and 18 of acid. It is soluble in water and in alcohol, has a taste styptic and metallic, and exerts a degree of escharotic power. It is the most virulent of all the preparations of this metal, and cannot be given with safety in a larger

quantity than one fourth of a grain: its medium dose is one sixth or one eighth. It acts more generally on the system than any other preparation, and very speedily arrests the progress of syphilis, advantages which have frequently recommended its use. But it is liable to be violent in its operation, and its effects have been supposed not to be permanent, the disease frequently returning in the same or some other form; hence as an antisyphilitic, it is not much employed in regular practice. A very dilute solution of it is used as a collyrium in venereal ophthalmia, as a gargle in venereal sore-throat, and as a lotion in some cutaneous affections.

The Mild Muriate of Mercury, or Calomel, is obtained by triturating the corrosive muriate with nearly an equal part of the metal, and favouring their mutual action by the action of heat, the product being sublimed. The additional metallic mercury which is thus brought into combination, shares the oxygen and the acid of the corrosive muriate; so that the whole of the metal is in a lower degree of oxidation, and this oxide is combined with less muriatic acid. The quantity of acid, however, is as much as the oxide requires to combine with it, and hence the product is not a sub-muriate. The proportions of its principles, according to its analysis by Chenevix, are mercury 79, oxygen 9.5, and acid 11.5. It is mild in its operation, and is one of the most useful of the mercurial preparations. In syphilis it is given in the dose of a grain night and morning; it is likewise administered with the greatest advantage in glandular obstructions, dropsy, chronic rheumatism, hydrocephalus, hydrophobia, and in the fevers of warm climates, being given in several of these diseases in much larger quantities. It not only produces the general effects of a mercurial, but also, when given in sufficient doses, acts as a cathartic: it is often employed to promote the operation of other cathartics; and its peculiar determination to the intestines probably adapts it better to the treatment of diseases of the neighbouring organs, or to states of diseases connected with affections of the intestinal canal.

Muriate of Mercury and Ammonia, Hydrargyrus Præcipitatus Albus of the London pharmacopœia, is prepared by decomposing corrosive muriate of mercury by ammonia. A precipitate is obtained, which consists of oxide of mercury, combined with a portion of muriatic acid and a small quantity of ammonia, the proportions being 81 of oxide, 16 of acid, and 3 of ammonia. It is too acrid for internal use, but is employed externally as a mild escharotic, and as an application in various cutaneous affections. An ointment adapted to these purposes has a place in the London and Dublin pharmacopœias.

With acetous acid mercury forms the Acetis Hydrargyri,—a preparation which, as the basis of Keyser's pill, was at one time much celebrated for the mildness of this operation; it is given in a dose of from 2 to 5 grains; its operation has been supposed, however, to be uncertain, and it has fallen into disuse.

With phosphoric acid, Phosphate of Mercury is formed, a preparation of considerable activity and certainty, but which, though introduced, has not been established in practice. The dose of it is one grain. These as well as other saline compounds of mercury, are most easily obtained by adding to a solution of nitrate of mercury a solution of a compound salt, containing the acid with which the oxide of mercury is designed to be combined. Thus to form the acetate, a solution of acetate of potash is added; or to form the phosphate, a solution of phosphate of soda.

United with sulphur, mercury forms two preparations, the black sulphuret, and the red. In both of them the metal has been supposed to be oxidized, and in the red a large quantity of oxygen has been supposed to be contained. This has not been established, however, and it is probable that they are metallic sulphurets without oxygen. The black sulphuret, formerly named Ethiops Mineral, is prepared by triturating equal parts of mercury and sulphur together, so as to form a black powder. It is a very inactive preparation, and has been used only as

an anthelmintic, in a dose to an adult of one scruple or half a drachm. The red sulphuret, or Cinnabar, is the mercury united with about one-sixth of its weight of sulphur by sublimation. It is applied principally by fumigation, with the view of stopping the progress of venereal ulcers, being converted into vapour by being laid on a hot iron, and this vapour being directed on the part.*

FERRUM. Iron.

This metal is the one which has been regarded as most salutary to the animal system. It exists as a constituent part of the blood, and other varieties of animal matter, and it acts as a powerful tonic, increasing the power of digestion, quickening the circulation, and causing the blood, it is said, to assume a more florid hue, promoting the secretions, or restraining them when they have been morbidly increased. It has been considered as doubtful whether it acts by being received into the mass of blood; its existence as a constituent principle of the blood, and the slowness of its operation, render it probable that it does.

The diseases in which iron is used are those of chronic debility, especially chlorosis, dyspepsia, hypo-

* The preceding account of the practical application of mercury is exceedingly defective. But it is not easy to improve it, in the narrow limits of a note or, without indeed indulging in a discussion, wholly inconsistent with the strictly elementary nature of the present work.

Confessedly, we have no article possessed of such various powers, or which in the practice of this country especially, is employed in so many and diversified cases. There is, perhaps, no disease, either acute or chronic, in which mercury, under certain circumstances, may not be advantageously exhibited. It was, at least, the advice of the late Dr. Bond, who was deservedly one of the most distinguished of our physicians, that in all cases where other modes of treatment fail, we should resort, as a dernier resource, to mercury. By the adoption of this rule, he acquired immense celebrity for his extraordinary cures, and did more undoubtedly, than any one else, to raise our medicine to its elevated rank in the Materia Medica of the United States.—Ed.

chondriasis, hysteria, paralysis, and rickets. It succeeds best when given in small doses continued for a considerable time.

The Limatura Ferri, or Filings of Iron, are given in any dose from one scruple to a drachm or two; their activity is probably dependant on the oxidation they may suffer in the stomach, from the action of the gastric fluids.

The Carbonate, or Rust of Iron, Carbonas Ferri, Rubigo Ferri, is the metal oxidated by exposure to the air with moisture, and combined with carbonic acid ;it is more active than the pure metal, and less irritating than the saline preparations. It is given in a dose from 5 to 20 grains. Another form of it, supposed to be more pure, is what is named Carbonas Ferri Præcipitatus, prepared by adding a solution of carbonate of soda to a solution of sulphate of iron, washing and drying the precipitate formed by the mutual decomposition.

Muriate of Iron and Ammonia, of the Edinburgh pharmacopœia, what is named by the London College Ferrum Ammoniatum, is obtained, by sublimation, from a mixture of muriate of ammonia and red oxide or carbonate of iron. It is an active preparation, but liable to be variable in composition. It is given in a dose from 5 to 10 grains. Dissolved in diluted alcohol it forms an officinal tincture, the dose of which is 30 drops.

The Muriate of Iron employed under the form of tincture, prepared by dissolving black oxide of iron in muriatic acid, and diluting the solution with alcohol, Tinctura Ferri Muriati, is a very active preparation; sometimes too much so to admit of being used in an irritable state of the stomach. Its dose is 10 or 15 drops diluted with water, or taken in wine.

Sulphate of Iron is formed in the large way, by the oxygenation of the native sulphuret by exposure to air and humidity; or it is obtained more pure by dissolving iron in diluted sulphuric acid, and evaporating the solution. It crystallizes in rhomboidal prisms of a green colour. It is one of the most active preparations of the

metal, and is not unfrequently prescribed in amenorrhœa. Its dose is from one to five grains. The red sulphate, in which the metal is more highly oxidated, is also employed as a tonic in a similar dose.

The Tartrate of Potash and Iron has a place in the London pharmacopœia, though not much employed in practice. It is prepared by rubbing equal weights of iron filings and super-tartrate of potash with water, exposing the mixture to the action of the air, drying the mass, and again subjecting it to the action of water to render the oxidation and combination of the iron more complete. The preparation is a mild one, and can be given to the extent of 10 or 15 grains as a dose. A similar preparation, in which the iron is more highly oxidated, and its combination with the tartaric acid probably more perfect, is obtained by a process given by the London College, in which carbonate of iron and super-tartrate of potash are boiled with a portion of water, the liquor filtered, and evaporated until on cooling, it form a saline mass. This, in a dose of three or four grains twice a-day, acts not only as a tonic, but also as a diuretic, and, from the combination of these powers, has been employed with advantage as a remedy in dropsy.

The Wine of Iron, which has a place in the London and Dublin pharmacopœias, prepared by digesting iron-filings in white wine, is another form under which the tartrate is used; the metal being dissolved by the tartaric acid of the wine. Its dose is one or two drachms.

Acetate of iron has been introduced by the Dublin College, being prepared, according to one process they have given, by digesting carbonate of iron in acetic acid; according to another, by rubbing together acetate of potash and sulphate of iron until they become soft; drying this with a moderate heat, and digesting it with alcohol. Of the tincture thus formed, 20 or 30 drops are a dose.

The London College have given a place to a preparation of iron, (Liquor Ferri Alkalini,) or rather a sin-

gular nature. Iron is dissolved in nitric acid largely diluted; and to this solution a solution of sub-carbonate of potash is added, while effervescence is excited: the liquor, after standing for six hours, is poured off. It is probably a ternary combination of oxide of iron, potash and carbonic acid; any nitric acid remaining undecomposed in the oxidation of the iron, being probably combined with a portion of potash, and this nitrate being deposited. This preparation has been long known by the name of Stahl's Martial Alkaline Tincture. It is not very apparent what advantage it has over others in common use, and it is always liable to be variable in strength.

The Mineral Chalybeate Waters afford another form under which iron may be administered. The iron is generally dissolved in them by the carbonic acid: and from the state of dilution they are often used with more advantage than the more active preparations of the metal.

Zincum. Zinc.

This metal is of a white colour, with a shade of gray; it is brittle, except at a temperature between 200 and 300 of Fahrenheit, when it has a considerable ductility and malleability; it is fusible at a heat approaching to that of ignition, and when raised to that temperature burns with a bright flame, forming a white oxide.

Zinc exerts no sensible affection on the system in its metallic state; it is employed therefore under various forms of preparation.

White oxide of zinc, obtained from the combustion of the metal, has been employed as a remedy in various spasmodic affections, particularly chorea and epilepsy, in a dose of five grains, gradually increased. There are cases on record, where a cure was obtained; but it does not appear to be very active or certain in its operation, and it is not often prescribed. An ointment composed of it is used as a healing cerate, and as an application in ophthalmia.

There is a substance named Impure Oxide of Zinc, by the Edinburgh College, long known by the appellation of Tutia, the nature and origin of which are not very well ascertained. It has been supposed to be artificial, and to be prepared from oxide of zinc obtained in the roasting of zinc ores, which is afterwards mixed with clay. It is used sometimes as the basis of a cerate employed as a dressing to wounds, or applied to the eye in some forms of ophthalmia.

What has been named Calamine Stone, (Lapis Calaminaris,) is regarded as a carbonate of zinc; and it generally is so, though there are varieties of it composed of oxide of zinc and siliceous earth. It is employed only externally as the basis of the common healing cerate.

Sulphate of Zinc, formed by exposure of the native sulphuret to air and humidity, is obtained by evaporation of its solution in a solid mass, forming the white vitriol of commerce; or it is procured more pure, and in a crystalline form, by evaporation of the solution of zinc in diluted sulphuric acid. It has been employed in the same cases as the oxide, and Dr. Cullen has observed that it is possessed of the same powers; it has likewise been given as a tonic in intermittent fever, and as a tonic and astringent in chronic dysentery. It is difficult, however, to regulate its administration so as to obviate the nausea which it is liable to occasion. It is given sometimes as a powerful emetic, in a dose from 10 to 20 grains, particularly where the stomach is not easily roused to action, as where a narcotic poison has been swallowed. Its solution is a common astringent injection in gonorrhœa in the strength of a grain and a half to an ounce of water; and nearly of the same strength it is often employed as a collyrium in ophthalmia.

Acetate of Zinc, under the form of solution, has a place in the Edinburgh pharmacopœia, being obtained by mixing solutions of acetate of lead and sulphate of zinc, when sulphate of lead is precipitated, and the acetate of zinc remains dissolved. It is used as a collyrium in ophthalmia, and an astringent injection in gonorrhœa.

CUPRUM. Copper.

THIS metal is not like the greater number of the metals, insipid and inodorous; it has an unpleasant styptic taste, and when rubbed a perceptible smell. It is extremely noxious to animal life. Still, when properly administered, it proves a remedy of some value, and like zinc has some claim to be ranked as a tonic, from its successful operation in epilepsy, chorea, and several other spasmodic affections dependant on or connected with debility.

Copper is employed in various forms of saline combination. The sulphate is rather too active to admit of internal administration; even in a very small dose it excites nausea and vomiting; and as a powerful emetic it is employed, where from the state of the stomach it is difficult to excite vomiting, as where a narcotic has been taken in too large a quantity; the dose being from 2 to 5 grains, or even larger, according as it is more difficult to excite vomiting. Externally it is used as an astringent and escharotic,—applications of it to be afterwards noticed.

Sub-acetate of Copper, Verdigris as it has been named, is also employed on account of its escharotic power.

The preparation named Ammoniuret of Copper (Ammoniaretum Cupri, Cuprum Ammoniatum) is the one usually employed to obtain the action of copper on the system. It is prepared by triturating sulphate of copper and carbonate of ammonia together, and is either a ternary compound of oxide of copper, ammonia and sulphuric acid, or a mixture of sulphate of ammonia, and the compound of ammonia with oxide of copper. It is given in epilepsy, in a dose of half a grain twice a-day, increasing it gradually as far as the stomach or system will bear it, continuing it until the remedy has received a fair trial. It has in many cases proved successful, though in a disease arising from such various causes, and so frequently depending on derangement of organic

structure, any remedy must frequently fail. It has been given in a similar manner with advantage in chorea and dysphagia.

ARSENICUM. Arsenic.

THE name arsenic, used to be appropriated to what has been ascertained to be the oxide of a peculiar metal, and in chemical nomenclature it is to this metal that the name is now applied. In its metallic state, it is of a dark gray colour; with considerable lustre; its texture is foliated, and it is extremely brittle. It is volatile at a heat considerably inferior to that of ignition, and when in vapour has a peculiar smell, often compared to that of garlic. At the same temperature it is oxidated rapidly by the action of the air, forming a white vapour which condenses. At a higher temperature it burns, and affords the same product. This product used to be regarded as an oxide. Being soluble however in water, capable of crystallizing, reddening the infusion of litmus, and combining with the alkalis, it has been regarded as an acid, and has been named Arsenious Acid. Though there is some foundation for this conclusion, this substance may perhaps still be ranked as an oxide; for it does not neutralize the alkaline properties nor act on them more forcibly than many other metallic oxides; and it even neutralizes the properties of acids. By a higher degree of oxygenation, it is converted into a substance of undoubted acid powers, the arsenic acid.

The oxide of arsenic, or white arsenic of commerce, is not formed from the oxygenation of the metal, but is obtained by sublimation from various metallic ores in which it exists. The sublimate is in the form of a white dense cake, which is reduced to powder, for the uses to which it is applied. In the London pharmacopœia, this is ordered to be prepared for medicinal use by a second sublimation. It consists of 75.2 of arsenic, and 24.8 of oxygen. Its taste is acrid and penetrating; it is soluble in 80 parts of cold, and in 15 parts of boiling water; the latter solution, on cooling, affording minute crystals.

This substance has been long known as the most viru-

lent of the mineral poisons. Even in a very small quantity, it occasions vomiting, purging, tremors, and paralysis; in a quantity a little larger, it excites severe pain in the stomach, extreme thirst, violent vomiting, with great anxiety and depression. The pain extends over the abdomen, respiration becomes difficult, the pulse is quick and irregular, the vomiting is incessant, accompanied with tremors and convulsions, and the patient dies exhausted. On dissection, the internal surface of the stomach and upper part of the intestines is found inflamed or eroded.

Though so violent in its operation, arsenic has been frequently employed in medical practice; and when properly administered, we obtain from it, in certain diseases, all the advantage which is derived from the operation of the most safe and powerful tonic. This is well displayed in its efficacy in the treatment of intermittent fever, the disease in which it has been principally used.

It is employed medicinally under various forms. A preparation of it introduced by Fowler, and analogous to one which had been known under the name of Tasteless Ague Drop, has been adopted by the London College, and named Liquor Arsenicalis. It is prepared by dissolving sixty-four grains of the white oxide, and the same quantity of sub-carbonate of potash, in sixteen ounces of water, adding half an ounce of compound spirit of lavender. This is given in a dose of four drops, three times a-day, and gradually increased to double that quantity; its use being occasionally intermitted, not persisted in if it does not soon prove effectual, and immediately relinquished if it occasion nausea or purging. The arseniate of potash, prepared by exposing the white oxide of arsenic with an equal weight of nitre, to a heat gradually raised to redness, and crystallizing the residual mass, is another preparation which has been employed, and has been lately sanctioned by the Dublin College. It is used in the same manner, in the dose of the eighth part of a grain of the crystallized salt. Under the same forms arsenic has been used in remitting fever,

in periodical headach, in dropsy, hydrophobia, lepra, and elephantiasis, and undoubtedly with safety and advantage, though its administration will always require to be conducted with much care. Externally, it is used in scirrhus and cancer;—applications of it which will be noticed under the class of Escharotics.

The antidotes which have been employed to counteract the poisonous operation of arsenic are various. Vomiting, if not produced by the arsenic, which it generally is, must be immediately excited, and as the stomach is highly irritable in such cases, the milder emetics, and especially oil, which is supposed to involve the particles of the poison, have been recommended. According to the assertion of Renault, oil appears from experiments rather to favour its action; and tepid water, or mucilaginous liquors, ought to be preferred; these too are useful in facilitating vomiting, and scarcely any thing more than this is within the power of the practitioner. Reliance has been placed on solutions of the alkaline sulphurets, or of sulphuretted hydrogen. The latter appears, from Renault's experiments, to have some power, since, if it were previously combined with the arsenious acid, it rendered it nearly inert; but if merely introduced into the stomach with it, or after it had been swallowed, especially if the arsenic were not dissolved, it seemed to have little efficacy as an antidote, and indeed cannot be expected to have much effect.

Bismuthum. Bismuth.

This metal is of a white colour, with a shade of yellow, has a foliated fracture, is brittle, very fusible, capable of being volatilized, and easily susceptible of oxidation. Though it has not been received into the pharmacopœias, it has a claim to a place in the Materia Medica, as its oxide, or rather sub-nitrate, has been employed with considerable advantage in Gastrodynia, Pyrosis, and other affections connected with debility of the digestive organs. This preparation is obtained by decomposing the solution of bismuth in nitric acid by

the affusion of water; the sub-nitrate is precipitated, and is washed and dried. It is given in a dose from two to six grains, two grains being given twice or thrice a-day, or in more severe cases five grains being given at once. In these doses, it scarcely produces any other sensible effect than a remission of pain, and ultimately a removal of the morbid state from which this has arisen.

Barytes. Terra Ponderosa Barytes. Heavy Earth.

This earth is found in nature combined with sulphuric acid, and with carbonic acid. The native carbonate was known to prove poisonous to animals, and this suggested the application of it to medicinal purposes. The form under which the barytes has been used, is in combination with the muriatic acid; for the preparation of which a formula has been inserted in the Edinburgh pharmacopœia, either by decomposing the native carbonate by muriatic acid, or decomposing the sulphate by heating it with charcoal, and adding this acid to the solution obtained by washing the residual matter with water. The muriate is obtained by crystallization. This salt has been employed as a remedy in scrofula, in cancer, some forms of syphilis, and in hectic fever connected with ulceration. Its sensible effects, where advantage has been derived from it, have been, improving the appetite and general strength; sometimes it occasions diaphoresis or diuresis, and in an over dose is liable to produce nausea, vertigo, tremors, and insensibility. Its usual dose is five drops, gradually increased to twenty or more. Its virtues have been perhaps overrated, as it is rather falling into disuse.

Calx. Lime.

This earth exists abundantly in nature combined with carbonic and other acids. From the native carbonate it is obtained by expelling the carbonic acid by heat. It is soluble in water in small quantity; the solution has a styptic taste, and is the form under which lime has been medicinally employed. It is used with advantage in dyspepsia, its beneficial effects arising

principally from its tonic and astringent quality, as in the small quantity which water can dissolve, it can have little effect by any chemical agency in obviating acidity. It is employed too as an astringent in chronic diarrhœa and in leucorrhœa. As a pure tonic, the product of the combination of it with muriatic acid, the muriate has been introduced into practice as much superior in efficacy to muriate of barytes, and a formula for preparing it is given by the Edinburgh and Dublin Colleges. It has been used principally in scrofula and hectic fever, and in dyspepsia. Its dose is from half a drachm to a drachm of the saturated solution; and as it is a medicine of considerable activity, it requires to be given with caution. Carbonate of lime is used as an antacid: and Phosphate of lime has from theoretical views been proposed as a remedy in rickets and mollities ossium.

The two following substances, though not strictly belonging to the mineral kingdom, may be associated with the preceding tonics, as connected with them by chemical relations.

Acidum Nitricum. Nitric Acid.

This acid is the product of the saturation of nitrogen with oxygen, and consists of 29.5 of the former, and 70.5 of the latter. It is generally obtained by decomposing nitrate of potash by sulphuric acid, assisted by heat. It is colourless; emits white fumes; its specific gravity is 1.504; is extremely corrosive, acts with much energy on inflammables and metals from parting with oxygen readily, and is eminently possessed of all the acid properties.

The tonic powers of this acid are conspicuous in supporting the system under the irritation of a mercurial course. As a remedy against lues venerea, it was some years ago introduced into practice, and received a very extensive trial; and the result appears to have been suf-

ficiently established, that it is, to a certain extent at least, capable of counteracting the syphilitic poison. The secondary symptoms of the disease have disappeared under its use, and the primary symptoms been completely removed. It is however inferior to mercury in the certainty of its operation, but still is a valuable remedy combined with it, both as promoting its operation, and as obviating the injurious effects of mercurial irritation. With such views, it is given in a dose of from one to two drachms, this being taken largely diluted with water, in the course of the day. It is likewise administered with advantage in that chronic affection of the liver frequently arising from residence in a warm climate, in dispepsia particularly with the view of relieving sickness and anorexia, and in obstinate cutaneous eruptions.

Oxy-murias Potassæ. Oxy-muriate of Potash.

This salt, which, strictly speaking, is the Hyperoxymuriate of Potash, is prepared by introducing a current of oxy-muriatic acid gas into a solution of potash. The acid is decomposed, one portion of it yielding oxygen to the other; the one therefore returns to the state of muriatic acid, the other becomes hyper-oxymuriatic acid, and common muriate and hyper-oxymuriate of potash are formed, the latter separating by crystallization in brilliant white flakes. The process has been introduced into the Dublin Pharmacopœia.

As a remedy, it may be classed with the nitric acid, and it was the hypothesis of nitric acid acting medicinally by imparting oxygen to the system, that led to its medicinal use. Its operation in checking or removing the symptoms of syphilis is similar; it also increases the force of the circulation, and excites the actions of the system. Its efficacy as an anti-venereal is considered as superior to that of the nitric acid, but it does not appear to be equally advantageous as an auxiliary to mercury. Hence, as its operation alone cannot be relied on for certainty, and as it frequently fails, it is little employed,

while nitric acid still continues to be occasionally used. The dose in which the oxy-muriate has been given, is ten grains three or four times a day, and increased gradually to twenty or twenty-five.

TONICS FROM THE VEGETABLE KINGDOM.

The tonic power of vegetable substances is intimately connected with certain sensible properties which they possess, particularly with bitterness, and the aromatic quality. In those tonics in which these qualities are blended, they are their most distinctive properties; and in those in which either of them is predominant, we still discover a degree of tonic power, or of that stimulating operation on which this power depends.

The vegetable products in which bitterness, without any other marked sensible medicinal quality, predominates, have always more or less of a tonic power; the stimulant operation on which this depends, seems, however, to be not much extended over the system: hence they have scarcely any sensible effect in augmenting the force of the circulation, or the heat of the body, in increasing the secretions, or in stimulating to action any particular part; their operation is principally in giving vigour to the stomach, and other digestive organs, and obviating those symptoms connected with debility of these organs. Still their operation is not entirely local; they prove tonic to the general system, not only indirectly by their action on the stomach, but by a more direct operation. This is displayed in their power of removing diseases connected with general debility, as intermittent fever, or the different species of dropsy, particularly anasarca, which so frequently depend on diminished energy of the absorbents. The injurious consequences which sometimes arise from the use of bitters too long continued, affords another proof of their action on the general system.

Bitterness in vegetables has been supposed to reside in a peculiar proximate principle, which has been named the bitter principle. This opinion, however, is extremely vague, and rests on no sufficient evidence. The quality of bitterness may reside in any of the known principles of vegetable matter: in many of the bitters of the Materia Medica, it appears to be connected with their extract, as it is obtained equally by the action of water in alcohol; it is not volatile, and in general is not much impaired by decoction.

Aromatics are more rapid and diffusible in their action; they sensibly stimulate the general system, and augment the force of the circulation; but this is scarcely sufficiently permanent to admit of their being administered with advantage as tonics. They are therefore rather employed as temporary stimulants, to obviate debility of the digestive organs, or as promoting the action of bitters. Still, as strictly connected with the substances belonging to this class, I have not hesitated to place them under it. There is one general virtue they possess, and for which they are often used, that of preventing or relieving nausea; this they do partly from their agreeable taste and odour, and partly probably from their stimulant operation on the stomach. The aromatic quality in general resides in their essential oil; hence it is communicated both to water and alcohol by infusion: their oils are usually pungent and stimulant, and their distilled waters and spirits partake of these powers.

From the qualities which bitters and aromatics possess, the stimulant operation of the one being slow and permanent, that of the other being more diffusible and transient, it might be inferred perhaps, that their combination will afford a superiority of tonic power. in the most powerful vegetable tonics, accordingly, these qualities are generally blended; these may be placed first, and from them there is a series to the more pure bitters and aromatics.

CINCHONA OFFICINALIS. *Cortex Peruvianus.* Cinchona. Peruvian Bark. *Pentand. Monogyn. Contortæ. Cortex. Peru.*

THE natural history of the genus Cinchona has been but imperfectly elucidated, and hence the Edinburgh College have inserted in their catalogue of the articles of the Materia Medica, the three kinds of Peruvian bark at present met with in the shops, the Pale, the Red, and the Yellow, leaving undetermined their natural distinctions. The species of this genus, it now appears, are numerous, and many of them natives of Peru; and it is not improbable that all, or the greater number of these contribute to furnish the Peruvian bark of commerce. The London College have inserted three species, Cinchona Lancifolia, Cinchona Cordifolia, and Cinchona Oblongifolia; the first, according to Dr. Powel, furnishing the pale bark, the second the yellow, and the third the red.

These barks appear to be procured and prepared in a similar manner. The bark is stripped from the trunk and branches; it is dried by exposure to the sun, and after being imported into Europe, is sorted by separating the finer from the coarser.

The pale bark is in the form of small quilled twigs, thin, breaking close and smooth, friable between the teeth, covered with a rough coat of a grayish brown colour, internally smooth, and of a light brown; when thick and not convoluted, it is considered as of inferior quality; its taste is bitter, and slightly astringent; its flavour slightly aromatic, with some degree of mustiness.

The Red is in large thick pieces, usually flat, though sometimes quilled, externally covered with a brown rugged coat, internally more smooth and compact, but fibrous, of a dark red colour; its taste and smell are similar to those of the pale, but the taste is rather stronger.

The Yellow, so named because it approaches more to that colour than either of the others do, is the variety last introduced. It is in flat pieces, not convoluted like

the pale nor dark-coloured like the red; externally smooth, internally of a light cinnamon colour, friable and fibrous; it has no peculiar odour different from the others, but a taste incomparably more bitter, with some degree of astringency.

Cinchona has often been subjected to chemical examination, but its constituent proximate principles are still not well determined. This indeed appears to be attended with peculiar difficulties, from the different species containing different principles, and from the nature of some of these being not well ascertained.

The basis of all of them is the ligneous fibre, constituting the greater part of their weight, but to this are attached various principles capable of being extracted by different solvents. Cold water infused on pale bark for some hours, acquires a bitter taste, with some share of its odour; when assisted by a moderate heat, the water takes up more of the active matter; this infusion is transparent while warm, but as it cools becomes slightly turbid; by decoction, a fluid, deep coloured, of a bitter styptic taste, is obtained, which, when cold, deposites a precipitate soluble in alcohol. By long decoction, the virtues of the bark are nearly impaired or destroyed, owing to the chemical change and precipitation of its active matter. Alcohol is a more powerful solvent of its active principles than water, the tincture being of a much deeper colour and stronger taste, and holding more matter dissolved. Brandy and other spirits and wines afford also strong solutions in proportion to the quantity of alcohol they contain. A saturated solution of ammonia is also a powerful solvent; vinegar is less so even than water. By distillation, water is slightly impregnated with the flavour of bark; but it is doubtful whether any essential oil can be obtained.

The action of menstrua on the red bark is nearly the same, the solutions only being stronger, or containing a larger quantity of the matter which is precipitated from the decoction as it cools, and which is more peculiarly soluble in alcohol, this matter being apparently com-

posed of the principles in which the activity of the bark resides.

The analysis of the yellow bark shows that its active principles are more powerful than in either of the others, as it affords to water, alcohol, &c. tinctures much stronger both in bitterness and astringency, especially in the former quality.

It is not easy to determine from these results, the nature of the principles extracted, or what relation they have to the powers of the bark. As the active matter appears to be more soluble in hot than in cold wate r being partially precipitated from the former as it cools, and as it is still more soluble in alcohol, it might be concluded to be of a resinous nature. Being soluble to a certain extent, however, in water, and suffering at least a partial decomposition when boiled under exposure to the air, it may also be considered as approaching in its characters to extract.

Besides this, from the effects of re-agents, Peruvian bark has been considered as containing a quantity of astringent matter, and this matter appears to have some relation to the matter extracted by water with the aid of heat, and by alcohol. On adding a solution of sulphate of iron to the infusion, a deep colour is struck, not purple indeed like that usually produced by the action of that test in the vegetable astringents, but rather of a dark olive green ; the same colour is still deeper when the salt is added to the decoction, or the tincture. This was regarded as a proof of the presence of the astringent principle or tannin, and hence it might be inferred, that a precipitate would be produced by the addition of gelatin. This accordingly happens with some kinds of Peruvian bark ; a solution of gelatin added to the infusion giving a precipitate more or less copious. But the singular fact has been discovered, that there are other varieties which do not precipitate gelatin, but have the opposite property of giving a precipitate with tannin, or at least with infusion of oak bark, or infusion of galls. This latter phenomenon, Seguin considered absurdly as

depending on the presence of gelatin, and pretended that gelatin exerted the specific power of Peruvian bark on the system, so that with animal glue he had cured intermittent fever. Dr. Duncan inferred, that the phenomenon is owing to the presence of a peculiar proximate principle of vegetable matter not before observed, to which he has given the name of Cinchonin. Vauquelin, in his analysis of the different species of Peruvian bark, found generally, that their aqueous infusion gave a precipitate both with tannin and gelatin; some, however, gave no sensible precipitate with gelatin, while they precipitated tannin. Among these, he ranks the common pale bark. Others again did not precipitate tannin, but formed a precipitate with gelatin. His observations, however, are of less value, as although deduced from experiments on seventeen species, as he calls them, of cinchona, these are not distinguished by their specific characters, and we therefore scarcely know to what the observations apply. From the intermixture of different kinds of Peruvian bark in commerce, and the uncertainty of their uniformity, it is not easy to determine what species more peculiarly afford this principle. I have found, that the watery infusion of the pale bark is not sensibly precipitated either by gelatin or tannin; that of the red bark is not precipitated by gelatin, but gives a copious precipitate with tannin; and that of the yellow is rendered turbid by gelatin, and precipitated copiously by tannin.

There is a difficulty in determining the nature of the principles on which these phenomena depend,—either that which gives a precipitate with gelatin, or is precipitated by tannin, if these differ from each other. Neither is it very apparent what relation they have to the matter in which the active powers reside; it may be concluded, however, that they are not essential to it, since they are not found in pale bark, and since they are not uniform in the other species in any relation to the medicinal qualities. The same facts prove, that they have no relation to the resino-extractive matter, the principle probably of greatest activity of any which bark contains.

The infusions of some varieties of bark redden the more delicate vegetable infusions, and Vauquelin has discovered, in the matter extracted by water with the aid of heat, a salt composed of lime, with a peculiar crystallizable acid, which he has named Kinic Acid.

The active matter of bark is rendered more soluble in water by acids, a circumstance of some importance in its pharmaceutic preparation. The alkalis also add to its solubility; and some of the earths particularly lime and magnesia, have the same effect.

The comparative medicinal activity of the different kinds of Peruvian bark is not easily determined, owing to the variable state in which they are found in the shops. The red, at its first introduction, was represented as much superior in efficacy to the pale, and this appeared to be confirmed by chemical experiments on the proportion of active matter in it to that of the ligneous fibre; but there is some reason to doubt of this superiority with regard to the red bark now frequently met with. The yellow bark has a much greater degree of bitterness, and some clinical observations appeared to establish its superior medicinal power. Even if this be admitted, its intense bitterness renders it unpleasant, and liable to occasion nausea.

The effects of Peruvian bark are those of a powerful and permanent tonic, so slow in its operation as to be scarcely perceptible by any alteration in the state of the pulse or of the temperature of the body. Its tonic power is inferred, therefore, principally from obviating states of debility and it is one of those medicines, the efficacy of which, in removing disease, is much greater than could be expected, *à priori*, from its effects on the system in a healthy state. The only effects arising from too large a dose are nausea and headach.

Intermittent fever is the disease for the cure of which bark was introduced into practice, and there is still no remedy which equals it in power,—a superiority of which from its known operation, it is difficult to give any explanation. Little diversity of opinion now exists

with regard to the rules regulating its administration. It is given freely in the earliest stage of the disease, and without any previous preparation, farther than the exhibition of an emetic to evacuate the stomach. And it may be employed with safety and advantage in every period of the fever. It has been supposed rather more effectual when given before the recurrence of the paroxysm, and that from this mode of employing it, less is required for the cure. The usual practice, however, is to give it in doses of a scruple or half a drachm every fifth or sixth hour during the interval of the paroxysm; and it may be given with safety during the hot fit, being then only more apt to excite nausea. It requires to be given for some time, and continued after the fever has been removed, in order to prevent a relapse.

In remittent fever it is given with equal freedom, even though the remission of the fever may be obscure, and frequently with advantage.

In those forms of continued fever which are connected with debility, as in typhus, cynanche maligna, and confluent small-pox, &c. bark has been regarded as one of the most valuable remedies. It is difficult, however, to give it in such quantities as to obtain much sensible effect from it, as from the weakened state of the organs of digestion, it remains in the stomach unaltered, and is liable to produce nausea and irritation. In modern practice, therefore, bark is less employed in typhus, preference being given to the more powerful exciting operation of opium and wine. It has been regarded as hurtful even in those forms of fever, where the brain or its membranes are inflamed, or where there is much irritation, marked by subsultus tendinum, and convulsive motions of the extremities. Advantage is sometimes derived from it in the convalescent stage of the disease.

Even in fevers of an opposite type, where there are marks of inflammatory action, particularly in acute rheumatism, bark has been found useful, blood-letting being generally previously employed.

In erysipelas, in gangrene, in extensive suppuration, and in scrofulous and venereal ulceration, the free use of bark is of the greatest advantage.

In the various forms of passive hæmorrhagy, in many other diseases of chronic debility, dyspepsia, hypochondriasis, paralysis, rickets, scrofula, dropsy, and in a variety of spasmodic affections, epilepsy, chorea, and hysteria, cinchona is administered as a powerful and permanent tonic, either alone, or combined with other remedies suited to the particular case. The more common combinations of it are with sulphuric acid as an astringent, with preparations of iron as a tonic, with mercury in syphilis, in spasmodic diseases with valerian, and with cicuta in scrofula, and extensive ulceration.

Its usual dose is half a drachm. The only inconvenience of a larger dose is its sitting uneasy on the stomach. It may, therefore, if necessary, be frequently repeated, and in urgent cases may be taken to the extent of an ounce or even two ounces, in twenty-four hours, though from such large doses probably no adequate advantage is derived.

The powder is more effectual than any of the preparations; it is given in wine, in any spiritous liquor, or, if it excite nausea, combined with an aromatic. The cold infusion is the least powerful preparation, but is grateful and sits easy on the stomach; it is however so weak, that it is scarcely used but as a bitter in dyspepsia. Prepared by previous trituration of the bark with a little magnesia, it is rather more active. The decoction contains more of the active matter of the bark, and is the preparation generally used when the powder is rejected; its dose is from 2 to 4 ounces; but even it cannot be relied on for any important effect. The spiritous tincture, though containing more of the active principles, cannot be extensively used on account of the menstruum, but is principally employed, occasionally and in small doses, of 2 or 3 drachms, as a stomachic. The extract is a preparation of some power, when properly prepared by the joint action of alcohol and water;

but as this is expensive, the watery extract only is usually found in the shops, and it is very variable in strength. It is given in the form of pill, in a dose from 5 to 15 grains, and affords the best form for combining bark with iron.

Bark is likewise sometimes given in the form of enema; 1 scruple of the extract, or 2 drachms of the powder, being diffused in 4 ounces of starch mucilage. The decoction is sometimes applied as a fomentation to ill-conditioned ulcers, or the powder is sprinkled on the ulcerated surface.

Offic. Prep.—Decoct. Cinch. Extr. Cinch Inf. Cinch. Tinct. Cinch. *Ed.*—T. Cinch. C. *Lond. Dub.*

CINCHONA CARIBÆA. Caribæan Bark.

THIS species, belonging to the same genus, a native of the Caribee Islands, has been proposed as a substitute for Peruvian bark, and has as such been received into the Edinburgh Pharmacopœia. It is more bitter, and less aromatic, is of a brown colour, somewhat convoluted and fibrous. According to the observations of Dr. Wright, who employed it in Jamaica, its effects are similar to those of the officinal cinchona. The cinchona Floribunda, or St. Lucia bark, has been also sometimes used. It is of a darker brown colour; its taste is sweetish, but becomes extremely bitter. It has been found more liable than the other species to produce nausea and purging.

ARISTOLOCHIA SERPENTARIA. Serpentaria Virginiana. Virginian Snake-root. *Gynand. Hexand. Sarmentosæ. Radix. Virginia, Carolina.*

THIS root consists of a number of small fibres, issuing from one head, of a grayish brown colour; it has a slightly aromatic smell, and a warm bitterish taste. Its active matter is extracted partially by water, and by alcohol; entirely by proof spirit. By distillation, it affords a small quantity of an essential oil, somewhat fragrant, but not pungent.

Serpentaria is a stimulating aromatic tonic, which used formerly to be much employed in fevers of the typhoid type, to support the powers of the system. It was given in a dose of from 10 to 20 grains every fourth or fifth hour; with this intention, it is now, however, very rarely prescribed, and in any tonic power it possesses is probably considerably inferior to cinchona. It is sometimes combined with cinchona in the treatment of intermittent fever, and occasionally enters as an ingredient into the composition of bitter infusions and tinctures used in dyspepsia.*

Offic. Prep.—T. Arist. Serpent. *Ed. L. D.*

Dorstenia contrayerva. Contrayerva. *Tetrand. Monog. Scabridæ. Radix. Peru, West Indies.*

This root is in small twisted fibres, of a yellowish colour; has an aromatic smell, and a bitterish taste; yields its active matter to water and alcohol. Contrayerva, like serpentaria, was formerly used as a stimulant in

* The serpentaria is certainly a much more important article than it is here represented to be. Whether alone, it is adequate to the cure of confirmed ague and fever I am not prepared to say. But in combination with Peruvian bark, it proves a useful auxiliary to that medicine, and enables the stomach in many instances to bear it, when otherwise it would be rejected.

To remittent fever it is still better adapted, being often preferable even to the bark, inasmuch as it is rarely offensive to the stomach, and may be given, without injury, in those obscure states of the disease, where the remission is not readily discernible.

As a remedy in the secondary stages of pneumonia, and in catarrhal and other winter affections, this species of snake-root has long had an indisputable reputation. It is always employed under these circumstances in infusion with a view of exciting perspiration which it rarely fails to do, and of course, of affording more or less relief.

Many diseases might be added, in which it is prescribed with great advantage; but such a detail would be superfluous as, perhaps, the powers of no medicine are more accurately understood by American practitioners. I shall, therefore, only further remark, that it has been found eminently beneficial in checking bilious and other vomitings, and hence, most probably, its great efficacy in that form of pneumonia which is properly enough denominated *bilious* pleurisy.—Ed.

typhoid fever, in a dose from 5 to 20 grains, but like it too has fallen into disuse. Mixed with carbonate of lime, it forms the compound powder of contrayerva of the London Pharmacopœia, which is used as a remedy in diarrhœa.

Offic. Prep.—P. Contrayerv. C. *Lond.*

Croton eleutheria. Cascarilla. *Monoec. Monadelph. Tricoccæ. Cortex. Bahama Islands, North America.*

Cascarilla bark is in small quills of a gray colour; has a slightly aromatic smell, and a warm bitter taste; it is highly inflammable. It has been used as a substitute for the Peruvian bark, and has been employed too as a remedy in dysentery, and in obstinate diarrhœa. Its usual dose is a scruple or half a drachm, but in modern practice it is little used.

Offic. Prep.—Infus. Casc. Tinct. Casc. *Lond.*—Extr. Casc. Resin. *Dub.*

Cusparia febrifuga. Angustura. *Pentand. Monogyn. South America.*

This bark was imported a few years ago from the Spanish West Indies, the botanical characters of the tree, producing it, being unknown. These have been lately determined by Humboldt, and the London College have adopted the name Cusparia Febrifuga, by which they distinguish it. It is in flat pieces, externally gray and wrinkled, internally of a yellowish-brown colour, and smooth; it has little odour; its taste is bitter and slightly aromatic. Water, assisted by heat, takes up the greater part of its active matter, which does not seem to be injured by decoction. Alcohol dissolves its bitter and aromatic parts, but precipitates the extractive matter dissolved by water, and its solution is on the contrary decomposed by water. Proof spirit appears to be its proper menstruum. By distillation, it affords a small quantity of essential oil. The bark triturated with lime or potash, and water, gives a smell of ammonia.

Angustura is a powerful antiseptic. It was originally

introduced in the West Indies as a remedy in fevers, equal or even superior to the Peruvian bark. In this country it has not been much employed as a substitute for cinchona; and in the treatment of intermittent, it has in the trials that have been made of it failed. It has been used principally in obstinate diarrhœa, and in chronic dysentery, or as a remedy in dyspepsia. Its dose is from 10 to 20 grains of the powder, or one drachm in infusion or decoction. Its tincture with proof spirit is given in a dose of one or two drachms.

Offic. Prep.—Infus. Cuspar. *Lond.*—Tinct. Angust. *Ph. Dub.*

SWIETENIA FEBRIFUGA. Swietenia. *Decand. Monogyn. Trihilatæ. Cortex. East Indies.*

THE bark of the wood of this tree is of a red colour internally; externally it is covered with a gray epidermis; it has an astringent bitter taste; it yields its active matter to water, by infusion or decoction, and by evaporation an extract is obtained, highly astringent. It was introduced as a substitute for Peruvian bark, and in India has been used as such with advantage. Its dose in substance is half a drachm.

SWIETENIA MAHAGONI. Mahogany. *Cortex. Spanish America, West Indies.*

THIS species, of the same genus as the preceding, has similar qualities and virtues, being equally bitter and astringent. It has therefore been received into the Edinburgh Pharmacœpia, and may be employed to answer similar indications.

COLUMBA. (Calumba *Pharm. Lond.*) Columba.

OF the plant which furnishes this root, no botanical account has been obtained. It has been said to be brought from Ceylon; but from later accounts, it appears to be the produce of Southern Africa.* It is in round

* Not long ago a plant. which is commonly considered as a species of Colomba, but which is more probably a species of Gentian, was discovered in the vicinity of

thin pieces, evidently formed by transverse sections of the root; the circumference of these is covered with a bark; the woody part is of a light yellow colour. It has an aromatic smell, and a bitter taste. It yields its bitterness to water; but proof spirit is its proper menstruum, though the tincture is not very strong.

Colomba is a powerful antiseptic and bitter; it is used with much advantage in affections of the stomach and intestinal canal, accompanied with redundance of bile; it is also employed in dyspepsia, and forms a more powerful and grateful stomachic than the common bitters. Its dose is half a drachm of the powder, which in urgent cases may be repeated every third or fourth hour.

Offic. Prep.—Tinct. Colomb. *Ed. Lond. Dub.*—Infus. Colomb. *Lond.*

Quassia Simarouba. Simarouba. *Decand. Monogyn. Gruinales. Cortex. South America.*

The bark of the root of this tree, which is the part medcinally employed, is in long pieces, of a fibrous texture and yellowish colour; destitute of odour, and having a strong bitter taste. It is however very variable in its sensible qualities, some having scarcely any bitterness. Water and alcohol dissolve its active matter; the solution in either suffers no change from sulphate of iron.

Simarouba has been celebrated as a remedy in intermittent fever, dysentery, and chronic diarrhœa, and has been given generally in the form of decoction: in substance the dose is one scruple. Though used in the countries of which it is a native, it is with us rarely pre-

Marietta, in the state of Ohio. It appears from the most authentic accounts which we have had of it, to be a perennial plant, luxuriant and well proportioned, attaining to the heighth of eight or ten feet. I have heard it described as superior to the imported Colomba. But of this I am not altogether persuaded, as the specimens which I have seen of it seemed to possess much less of the bitter principle. To the botanist it is known by the title of Frasera Corolinensis, and by the people of the country it is called the Marietta Colomba.—Ed.

scribed. An infusion of it has a place in the London Pharmacopœia.

Offic. Prep.—Infus. Simaroub. *Ph. Lond.*

QUASSIA EXCELSA. Quassia. *Decand. Monogyn. Gruinales. Lignum. West Indies.*

THE wood of the root of this tree is of a yellowish white colour; it has a taste intensely bitter, without any odour or aromatic flavour. The bitterness is extracted equally by water and by alcohol.

It is used as a remedy in dyspepsia, diarrhœa, and in remittent and intermittent fevers, and is also sometimes employed to check vomiting. It is commonly given under the form of the watery infusion; in substance, in which state it has been employed in the treatment of intermittents; its dose is from ten to thirty grains.

Offic. Prep.—Infus. Quass. *Ph. Lond.*—Tinct. Quass. *Ph. Dub.*

GENTIANA LUTEA. Gentian. *Pentand. Digyn. Rotaceæ. Switzerland, Germany.*

THIS root is in long slender pieces, soft and flexible, of a yellowish colour, with a grayish epidermis. It has a very bitter taste, without any peculiar flavour. This bitterness is extracted both by water and alcohol. Diluted alcohol is its proper solvent.

Gentian is a common remedy in dyspepsia, in the form of infusion or tincture; and as a bitter, usually forms the basis of stomachis remedies. In substance, it has been used, though much more rarely, for the cure of intermittents, in a dose of half a drachm.

Offic. Prep.—Extr. Gent. Lut. Inf. Gent. C. T. Gent. C. *Ph. Ed. Lond. Dub.*—Vin. Gent. C. *Ed.*

ANTHEMIS NOBILIS. Chamæmelum. Chamomile. *Syngenes. Polygam. superfl. Compositæ. Flores. Indigenous.*

THERE are two varieties of these flowers obtained by cultivation, the single and double flowered: the former is much stronger, the odour and taste residing not in

the white petals, but in the disk or tubular florets. Both have a bitter nauseous taste, and a strong unpleasant odour. The bitterness, with part of the odour, is extracted by water and alcohol, and if the infusion has been made with warm water, it is nauseous. Distilled with water, they yield a small quantity of essential oil.

Chamomile is a powerful bitter, and as such is useful in dyspepsia, forming a popular remedy which is in common use. When employed for this purpose, it ought to be under the form of the cold infusion, which is most grateful. The infusion in tepid water, when strong, acts as an emetic, and is often used to promote the action of other emetics. In substance, it has been given as a remedy in intermittent fever, in a dose of half a drachm three or four times a-day. Externally, the flowers steeped in water are employed as a fomentation. The extract, which is intensely bitter, is a convenient vehicle for forming pills, especially when it coincides in virtue with the substance prescribed under that form.

Offic. Prep.—Extr. Anth. N. *Edin. Dub. Lond.*—Inf. Anth. Ol. Anth. *Lond.*—Decoct. Anthem. *Ed. Dub.*

The following plants, possessing bitterness in a greater or less degree, were formerly much employed but are now discarded from practice. They possess no virtues but those of bitters, and as they have all more or less of a nauseous flavour, gentian, colomba or quassia is preferred to them. It is necessary to notice only their botanical characters.

Artemisia absinthium. Wormwood. *Syngenes. Polygam. superfl. Compositæ. Herba. Indigenous.*

Chironia centaurium. Centaury. *Pentand. Monogyn. Rotaceæ. Herba.**

* Of the centaury, we have a species, the Chironia Angularis of Linnæus, which I have reason to believe is, in every respect, a very superior medicine to that which we derive from Europe. It is a very beautiful plant, growing abundantly

Marrubium vulgare. Hoarhound. *Didynam. Gymnosperm. Verticillatæ. Herba.*

Menyanthes trifoliata. Trefoil. *Pentand. Monog. Rotaceæ. Herba.*

Centaurea benedicta. Blessed Thistle. *Syngenes. Polygam. frustran. Compositæ. Herba. Spain.*

The remaining substances belonging to this class are those in which the aromatic quality predominates, blended in some of them with a degree of bitterness.

Citrus aurantium. Orange. *Polyadelph. Icosand. Pomaceæ. Cortex flavus Fructus; Fructus; Fructus immaturus. India.*

Though a native of India, this fruit is abundantly cultivated in the south of Europe. The outer rind of the fruit has a grateful aromatic flavour, and a warm bitterish taste. It is dried for use; both taste and flavour are extracted by water by infusion, as well as by alcohol; and by distillation a small quantity of essential oil is obtained. Its qualities are those of an aromatic and bitter. It has been employed to restore the tone of the stomach; and it is a very common addition to combinations of bitters used in dyspepsia, communicating to them its grateful odour, and coinciding with them in power. It has likewise been given in intermittents in a dose of a drachm twice or thrice a-day.

in many sections of the United States, and affords a pure bitter, with some slight aromatic flavour, which renders it rather pleasant to the taste and grateful to the stomach.

As a remedy, it is very extensively employed in our remittent and intermittent fevers, and with great success. It may be exhibited during the remission or intermission, or in any stage of the paroxysm, and therefore in some instances is preferable to the Peruvian bark. The usual mode of prescribing it is in strong infusion, of which copious draughts are directed to be repeatedly taken.—Ed.

Offic. Prep.—Aq. Citri Aur. Cons. Citr. Aur. Syr. Citr. Aur. *Ed.*—T. Cort. Aur. *Lond. Dub.*—Inf. Citr. Aur. *Lond.*

THE unripe fruit, *Aurantia Curasslaventia,* Curassoa Oranges as they are named, retain when dried the aromatic flavour of the peel, with rather a larger share of bitterness, and are applied to the same uses. The juice of the ripe fruit consists principally of acid and saccharine matter, and so far as it has any medicinal virtue is a refrigerant.

CITRUS MEDICA. Lemon. *Polyadelph. Icosand. Pomaceæ. Cortex fructus. Asia.*

THE exterior rind of the fruit of the lemon is similar in flavour and taste to that of the orange, but is rather less bitter and aromatic; its flavour too is more perishable, and from both circumstances it is less frequently used, though it may be employed for similar purposes. The juice is strongly acid, consisting chiefly of citric acid ; its medicinal applications fall to be considered under the class of refrigerants.

Offic. Prep.—Aq. Citr. Med.—Syr. Citr. Med. *Ed.* —Acid. Citric. *Pharm. Lond.*

LAURUS CINNAMOMUM. Cinnamon. *Enneand. Monogyn. Olearaceæ. Cortex. Ceylon.*

THIS tree, a native of Ceylon, is now cultivated in India. The cinnamon is the interior bark of the branches of the tree ; it is thin and much convoluted, of a texture somewhat fibrous, friable, of a light brown colour, having an agreeable pungent taste, with a degree of sweetness, and a grateful aromatic flavour. Its virtues chiefly depend on a small quantity of essential oil which it contains, and which, when obtained by distillation, is highly odorous and pungent.

Cinnamon is the most grateful of the aromatics. It is used to cover the unpleasant taste and flavour of other medicines, and to reconcile them to the stomach. It is

also employed by itself as a moderate stimulant, given generally under the form of the watery infusion or distilled water. The former is more grateful, and is often successful in relieving nausea and checking vomiting.

Offic. Prep.—Aq. L. Cinn. Sp. L. Cinn. T. L. Cinn. T. L. Cinn. C. Pulv. Cinn. Comp. *Ed. Lond. Dub.*

LAURUS CASSIA. Cassia. *Ennead. Monogyn. Oleraceæ. Cortex. Flores non-dum expliciti. India.*

THE Cassia Bark resembles that of cinnamon in appearance, taste and flavour; but is distinguished by its taste being more pungent, less sweet, and more mucilaginous than that of the real cinnamon; by its texture being denser, or less shivery, so that it breaks close and smooth, and by the pieces of it being thicker and less convoluted. Its aromatic quality, like that of cinnamon, resides in an essential oil. It affords a distilled water, stronger than that of the genuine cinnamon, and yields also its taste and flavour to water by infusion. It is used for the same purposes as cinnamon; it is, however, much less agreeable to the stomach, and rather more pungent and stimulating. It cannot, therefore, be always with propriety substituted for the other, especially where the stomach is in an irritable state. The Cassia buds dried, are similar in taste and flavour to the bark, and are often substituted for it in officinal preparations.

Offic. Prep.—Aq. L. Cass. *Ed.*

CANELLA ALBA. *Dodecand. Monogyn. Oleraceæ. Cortex. West Indies.*

THIS is the inner bark of the branches of the tree. It is in quills or flat pieces, of a light grayish colour; its flavour is somewhat aromatic, and its taste is pungent. By distillation it affords a thick essential oil.

Canella is employed principally on account of its aromatic quality, and generally in combination with other remedies to render them more grateful. It thus enters into the composition of several officinal tinctures, and

has been supposed, in particular, well adapted to cover the flavour of aloes.

Offic. Prep.—V. Aloes cum Canella. *Ph. Ed.* Pulv. Aloes cum Canella. *Ph. Dub.*

MYRISTICA MOSCHATA. *Monoec. Monand. Oleraceæ. Fructus nucleus, Nux Moschata dictus; Macis; Hujus Oleum fixum. India.*

UNDER the officinal name Myristica, are comprehended Nux Moschata or Nutmeg, and Macis or Mace; the former being the seed or kernel of the fruit, the latter the covering, with which it is immediately surrounded. The tree is a native of the Molucca islands. The external covering and pulp of the fruit are removed, and the nutmeg and mace are dried by exposure to the sun.

Nutmegs are round, of a grayish colour, streaked with brown lines, slightly unctuous; they have a strong aromatic flavour, and a pungent taste. They yield their active matter entirely to alcohol: distilled with water, they afford a fragrant and pungent essential oil; by expression, a sebaceous oil is obtained from them, retaining their fragrant odour, and part of their pungency.

Nutmeg is used in medicine as a grateful aromatic. It may be given in a dose from five to fifteen grains, and is sometimes employed to relieve nausea or vomiting, or to check diarrhœa, taken generally in wine. It has been said to prove narcotic in a large dose. It is also frequently employed to conceal the taste and flavour of unpleasant medicines, and to obviate the nausea they might excite.

Mace is a membranous substance, unctuous, of an orange yellow colour, and having a flavour and taste similar to the nutmeg, but rather less strong. It is used for the same purposes,

The expressed oil of nutmeg, which is generally known by the name of Oil of Mace, derives its smell and taste from the essential oil mixed with it. It is sometimes used as an external stimulating application, but in the shops is seldom found genuine.

Offic. Prep.—Ol. Myrist. Mosch. Sp. Myrist. Mosch.—*Ed. Lond. Dub.*

Eugenia caryophyllata. Caryophyllus Aromaticus. Clove. *Polyand. Monog. Hesperideæ. Flores cum pericarpio immaturo. India.*

The tree producing cloves is a native of the Molucca islands, and is cultivated in other parts of India. The cloves are the unexpanded flowers, which are dried by fumigating them, and exposing them to the sun. They are somewhat round, the division of the petals of the corolla being perceptible, of a grayish brown colour, slightly unctuous; they have a strong aromatic colour, and a pungent taste. They afford to water their flavour principally; to alcohol their taste. By distillation with water, they yield a fragrant essential oil, not very pungent. The oil of cloves commonly met with is rendered acrid by a portion of the resinous extract obtained by the action of alcohol being dissolved in it.

Cloves are among the most stimulating of the aromatics. They are employed principally as adjuvants or corrigents to other medicines. The essential oil is used with the same intention, and likewise as a local application to toothach. The infusion in tepid water has been employed as a grateful stimulant to relieve the sense of coldness in the stomach, which attends some forms of dyspepsia.

Offic. Prep.—Infus. Caryoph. *Pharm. Lond.*—Ol. Caryoph. Ar. *Ph. Ed.*

Capsicum annuum. Capsicum. Guinea Pepper, or Capsicum. *Pentand. Monog. Solanaceæ. Fructus. East and West Indies.*

The fruit of this plant is an oblong pod, of an orange colour, containing a pulp enclosing seeds. The membranous pod has an odour aromatic and penetrating, but which is impaired by drying; its taste is extremely hot and acrid, the sensation which it excites remaining long impressed on the palate. Its pungency is completely extracted by alcohol, and partially by water.

Capsicum is a very powerful stimulant. As such it has been given in atonic gout, in palsy and dyspepsia, and in the latter stage of fever, where the powers of life are nearly exhausted. It is also used as a condiment to food, especially in warm climates, and proves useful by obviating flatulence, and promoting digestion. An infusion of it in vinegar, with the addition of salt, has been used as a gargle in cynanche; but the practice, though it has been successful in the West Indies, is not without danger from the inflammation is liable to induce. The seeds have been found useful in obstinate intermittents, two grains being given at the approach of the cold paroxysm. The dose of the pod is from 5 to 10 grains.

Offic. Prep.—Tinct. Capsici. *Ph. Lond.*

PIPER NIGRUM. Black Pepper. *Diand. Trigyn. Piperitæ. Fruct. India.*

BLACK or common Culinary Pepper is the unripe fruit of this plant dried in the sun. Its smell is aromatic; its taste pungent. Both taste and smell are extracted by water, and partially by alcohol. The essential oil obtained by distillation, has little or no pungency.

Pepper, from its stimulating and aromatic quality, is employed as a condiment to promote digestion: as a medicine it is given to relieve nausea, or check vomiting, to remove singultus, and as a stimulant in retrocedent gout, and paralysis. Its dose is 10 to 15 grains. Its infusion has been used as a gargle in relaxation of the uvula.

White pepper is the ripe berries of the same plant freed from the outer covering, and dried in the sun. It is less pungent than the black.

PIPER LONGUM. Long Pepper. *Diand. Trigyn. Piperitæ. Fructus. East Indies.*

THIS is the berry of the plant gathered before it is fully ripened, and dried in the sun. It is oblong, indented on the surface, of a dark gray colour. In flavour, taste and other qualities, it is similar to the black pepper, and may be used for the same purposes.

Piper cubeba. Cubebs. *Diand. Trigyn. Piperitæ. Fructus. East Indies.*

Cubebs are the dried fruit of this tree. They have an aromatic odour, and moderately warm taste. Their virtues are similar to those of the other peppers, and being rather weaker, they are little used.

Myrtus pimenta. Piper Jamaicensis. Jamaica Pepper. *Icosand. Monog. Hesperideæ. Baccæ. West Indies.*

The berries of this tree are collected before they are ripe, and are dried in the sun. Their taste, though pungent, is much less so than that of the peppers; their flavour is fragrant, and has often been compared to that of a mixture of cloves, nutmeg and cinnamon. The flavour resides in an essential oil; the pungency in a resin. Pimento is used in medicine merely as an aromatic, and principally on account of its flavour.

Offic. Prep.—Aq. Myrt. Pim. Ol. Vol. Myrt. Pim. Sp. Myrt. Pim. *Ph. Ed. Lond. Dub.*

Amomum Zedoaria. Zedoaria. Zedoary. *Monand. Monog. Scitamineæ. Radix. India.*

This root is in oblong pieces, of an ash colour; its smell is aromatic; its taste pungent and bitterish. It contains a portion of camphor along with its essential oil.

Its virtues are merely those of an aromatic, and as it is rather weak, it is little used.

Amomum Zingiber. Ginger. *Monand. Monog. Scitamineæ. Radix. India.*

This plant is cultivated in the West Indies, whence the dried root is imported. It is in small wrinkled pieces, of a grayish white colour, having an aromatic odour, and a very pungent, somewhat acrid taste. The Black Ginger is the root prepared with less care than the White; the latter, previous to the drying, being scraped and washed.

Ginger yields its active matter completely to alcohol, and in a great measure to water. By distillation it affords

a small quantity of essential oil, which is fragrant, but not pungent, the pungency residing in a resino-extractive matter.

This root is frequently employed as a grateful and moderately powerful aromatic, either in combination with other remedies, to promote their efficacy or obviate symptoms arising from their operation, or by itself as a stimulant. With the latter intention, it is used in dyspepsia, flatulence and tympanitis. Its dose may be 10 grains.

Offic. Prep.—Syrup. Amom. Zingib. *Ph. Ed. Lond. Dub.*—Tinct. Zingib. *P. Lond. Dub.*

Amomum repens. Amomum Cardamomum. Cardamomum minus. Lesser Cardamom. *Monand. Monogyn. Scitamineæ. Semen. India.*

It was always somewhat uncertain, from which of the above species these seeds are obtained, and more lately, from a more accurate description of the plant, it has been entirely removed from the genus amomum, and placed under a new genus named Elettaria, the name chosen for the species being Elettaria Cardamomum. This has been admitted by the London College.

The seeds are dried, and imported in their capsules, by which their flavour is better preserved. Their smell is aromatic, their taste pungent, and both are communicated by infusion to water, as well as to alcohol. They afford by distillation an essential oil. They are used merely as grateful aromatics, and are frequently combined with bitters.

Offic. Prep.—Tinct. Amom. R. *Ed. Lond. Dub.*—Tinct. Cardom. Comp. *Lond. Dub.*

Carum carui. Caraway. *Pentand. Digyn. Umbellatæ. Semen. Indigenous.*

Caraway Seeds have an aromatic flavour, and a warm taste, depending principally on an essential oil, which they contain in considerable quantity. They are used to relieve flatulence, one or two drachms being

swallowed entire; their essential oil, which has considerable pungency, and is grateful, is not unfrequently added to other medicines, to obviate nausea or griping.

Offic. Prep.—Sp. Car. Carv. *Ed. Lond. Dub.*—Aq. Car. *Lond.* —Ol. Car. *Lond. Dub.*

CORIANDRUM SATIVUM. Coriander. *Pentand. Digyn. Umbellatæ. Semen. South of Europe.*

THE seeds of this plant have a more pleasant odour when dried than when fresh; their taste is moderately warm. Like caraway, they are used as carminative, and likewise to cover the taste and flavour of some medicines, particularly of senna, when given under the form of infusion or tincture.

PIMPINELLA ANISUM. Anise. *Pentand. Digyn. Umbellatæ. Semen. Egypt.*

THE seeds of anise have an aromatic odour, and a warm taste, with a share of sweetness. They afford, by distillation with water, a considerable quantity of an essential oil, having a strong, rather unpleasant odour, and a sweet taste, without much pungency. They are used chiefly as a carminative in dyspepsia, and in the flatulence to which infants are subject. A small quantity of the seeds may be taken, or, what is preferable, a powder composed of a few drops of the oil rubbed with sugar.

Offic. Prep.—Ol. Pimpin. Anis. *Ed. Lond. Dub.*—Sp. Anis. *Lond.*—Sp. Anis. C. *Dub.*

THE seeds of the following plants have qualities and virtues so very similar to those of the anise or caraway, that they do not require distinct consideration. They are used for similar purposes, but are scarcely entitled to a place in the Materia Medica.

ANETHUM FOENICULUM. Fœniculum dulce. Sweet Fennel. *Pentand. Digyn. Umbellatæ. Semen. Indigenous.*

ANETHUM GRAVEOLENS. Dill. *Pentand. Digyn. Umbellatæ. Semen. Spain and Portugal.*

CUMINUM CYMINUM. Cumin. *Pentand. Digyn. Umbellatæ. Semen. South of Europe.*

ANGELICA ARCHANGELICA. Angelica sativa. Garden Angelica. *Pentand. Digyn. Umbellatæ. Semen. Folia. Radix. North of Europe.*

Of this plant, the root possesses the greatest share of the aromatic quality, though it also belongs to the seeds and leaves.

MENTHA PIPERITA. Mentha Piperitis. Peppermint. *Didynam. Gymnosp: Verticillatæ. Herba. Indigenous.*

Of the different mints, this is the one which has the greatest degree of pungency. The leaves have a considerable degree of aromatic odour and taste. They afford an essential oil, rich in the aromatic quality and pungency of the herb. Peppermint is used as a stimulant and carminative, to obviate nausea or griping, or to relieve the symptoms arising from flatulence, and very frequently to cover the taste and odour of other medicines. It is used for these purposes under the forms of the watery infusion, the distilled water, and the essential oil.

Offic. Prep.—Aq. Menth. P. Sp. Menth. P. Ol. Menth. P. *Ed.*

MENTHA VIRIDIS. Mentha sativa. Spearmint. *Didynam. Gymnosperm. Verticillatæ. Herb. Indigenous.*

MENTHA PULEGIUM. Pennyroyal. *Didynam. Gymnosp. Verticillatæ. Herba. Indigenous.*

These two mints, spearmint and pennyroyal, resemble the peppermint in their general qualities, and are used for the same purposes, but are rather less agreeable and pungent. Their essential oil and distilled water are also inserted in the pharmacopœia.

HYSSOPUS OFFICINALIS. Hyssop. *Didynam. Gymnosp. Verticillatæ. Herba. Asia, South and East of Europe.*

This plant, nearly allied to the preceding in botanical characters, is possessed of very similar qualities and virtues, and is sometimes employed for the purposes for which they are used. It has also been considered as a remedy in catarrh, though it can have no efficacy.

CHAPTER VI.

OF ASTRINGENTS.

It has been supposed that the fibres of the living body, either over the whole, or in part of the system, may become relaxed, or lose that density and contraction which is necessary for the due performance of the several functions. And this is considered as an affection of the matter of which the fibre is composed, and not of the living or irritable principle connected with it. It has farther been imagined, that this relaxation may be removed by the application of those substances, which, when applied to dead animal matter, condense and constringe it; and such substances, classed as remedies, have received the appellation of Astringents. They are defined by Cullen: "Such substances as applied to the "human body produce contraction and condensation in "the soft solids, and thereby increase their density and "force of cohesion." And by the operation of this corrugating power, either directly exerted on a part, or extended by sympathetic action, the morbid affections arising from a state of relaxation are supposed to be removed.

The arguments adduced in support of these medicines exerting such a power, appear more conclusive than those brought in proof of any other explanations of the operations of medicines, founded on the mechanical physiology. Astringents, it is observed, exert in a remarkable manner, this corrugating power on dead matter; they are serviceable as medicines in those affections which seem to depend on a relaxed state of the solids; they even corrugate the fibres of living matter, as is evident from the sensation they impress on the tongue and fauces; and applied to bleeding wounds, they restrain the hæmorrhage apparently by the same power.

We cannot, however, admit, without limitation, the suppositions on which this hypothesis is founded,—that the affections which astringents obviate depend on mechanical laxity of the solids, and that these substances act solely by removing that laxity, by inducing a mechanical or chemical change. Debility was indeed once ascribed to such a cause; but it is now admitted, that every degree of strength or weakness depends much more on correspondent variations in the state of the powers peculiar to living matter; and substances capable of obviating diseases dependant on any state of debility, must be such as are capable of acting on these powers. Many substances accordingly, arranged as Astringents, occasion very considerable alterations in some of the functions: they produce effects which cannot be referred to their condensing power, allowing them to possess it; and therefore, in all the changes they produce, part of their operation at least must be referred to actions conformable to the laws of the living system.

For reasons of this kind, some have denied the existence of such a class of medicines as astringents. The substances which have usually received that appellation, they have considered as merely moderate stimulants, permanent in their action, and as differing little therefore from tonics.

It must be admitted, however, that there are substances which immediately restrain excessive evacuations; and that although between these and tonics there is in several respects a close resemblance, in others, they differ widely. The most powerful astringents, oak bark for example, or galls, are much inferior in their tonic power to other substances having little or no astringency; while there are powerful tonics which do not produce the immediate effects of astringents.

There appears, therefore, to be a foundation for establishing such a class as astringents, though it is very difficult to point out the precise nature of their operation. It must be admitted, perhaps, that astringents possess a power of corrugating or condensing the animal

fibre. The very sensation they excite in the mouth appears to be a sufficient proof of this, and it is farther established by chemical facts. That they likewise act as permanent stimulants, is proved by their power of removing intermittent fever and other states of the system connected with debility. The one power may be conceived perhaps to modify the other; and to this modification, or to their combined action, the effects of astringents may be ascribed. The hypothesis of Darwin, that they act by producing absorption, accounts for some of their effects, but not for others, particularly their power of stopping hæmorrhage.

Astringents, from the powers they possess, are capable of being applied extensively to the treatment of diseases.

As stimulants, acting with considerable permanence, they may be substituted for tonics in diseases of debility. It has been found accordingly, that they have power to stop the paroxysm of an intermittent fever, when given a short time before its accession: and in cases of debility, they seem to be often of utility, independant of their power of checking debilitating evacuations.

It is however for restraining evacuations that astringents are most usually employed. Hæmorrhage, where it does not rise from a solution of continuity, depends on the contraction of the extreme arterial branches not being sufficient to resist the impulse of blood from the larger branches,—a deficiency of contraction generally owing to a debilitated state of these vessels. Astringents, as stimulants, slow and permanent in their action, and not sensibly increasing the force of the circulation, are calculated to obviate such a state; and this may be farther promoted by their corrugating power, extended by sympathetic action to the vascular fibre. Hence their use in menorrhagia, hæmoptysis, and other discharges of blood; though they likewise frequently fail, from their operation being too slow and feeble, to resist the impetus of the circulation, or counteract the flow from a ruptur-

ed vessel. In epistaxis, or bleeding wounds, they are more powerful, as they can be more directly applied to the part.

By a similar operation, they in some measure check serous effusions: hence their use to restrain colliquative sweats. In diarrhœa too, they appear to operate by checking the effusion of fluid from the exhalant vessels, and thus diminishing the increased stimulant operation, which from this cause is exerted on the intestines, and increases their peristaltic motion. In the latter stage of dysentery, where an increased evacuation appears to be connected with debility of the exhalant vessels, their cautious administration is advantageous. And in passive inflammation, attended with increased serous discharge, as in gleet, and in some forms of ophthalmia, the topical application of astringents affords the most successful mode of treatment.

In the administration of astringents, it is an obvious caution, that they ought not to be applied to check evacuations where these are critical, or where they are necessary to relieve a plethoric state of the vessels, or a state of increased action; at least unless the evacuation proceed to an alarming extent.

Some narcotics, as opium, have sometimes effects apparently astringent. When increased discharges take place from irritation, these remedies, by diminishing irritability, lessen the discharge, they are thus serviceable both in hæmorrhage and in diarrhœa arising from that cause. But their mode of operation is obviously different from that of astringents, and in the cases in which they are useful, astringents would be less useful, and only by an indirect operation.

Astringents may be subdivided into those belonging to the mineral, and those belonging to the vegetable kingdoms, which differ considerably from each other in their chemical properties, and probably therefore in the mode in which they produce their astringent effect.

ASTRINGENTS.

FROM THE MINERAL KINGDOM.

Acidum sulphuricum.
Argilla.
Super-sulphas argillæ et potassæ.
Calx.
Ferrum.
Zincum.
Cuprum.
Plumbum.

FROM THE VEGETABLE KINGDOM.

Quercus robur.
Quercus cerris.
Tormentilla erecta.
Polygonum bistorta.
Anchusa tinctoria.
Hæmatoxylon campechianum.
Rosa gallica.
Arbutus uva ursi.
Mimosa catechu.
Kino.
Pterocarpus draco.
Pistacia lentiscus.

OF ASTRINGENTS FROM THE MINERAL KINGDOM.

Acidum sulphuricum. Sulphuric Acid. Acidum Vitriolicum. Vitriolic Acid.

Sulphur combines with oxygen in different proportions; when united with the largest proportion, it forms an acid extremely powerful from its state of concentration, the Sulphuric Acid. This acid used to be obtained from the decomposition of sulphate of iron, the Green Vitriol of commerce, by heat, and hence the name of Vitriolic Acid which was given to it. It is now formed

by the combustion of sulphur. The sulphur reduced to powder, is mixed with from one eighth to one tenth of its weight of nitrate of potash, by which its combustion, when begun, can be continued without the free access of atmoshperic air, the nitric acid of the nitrate affording the requisite quantity of oxygen. It is thus burnt in a large leaden chamber; the sulphuric acid, which is slowly formed, is absorbed by water placed in the bottom of the chamber, and the acid liquor is brought to the due degree of concentration, by exposing it to heat in glass retorts. It is of a thick consistence, and has an apparent unctuosity; its specific gravity is 1.850; it is colourless and transparent, is highly corrosive, and possesses all the general acid properties in an eminent degree. As obtained by this process, it is not perfectly pure, but contains a little sulphate of potash, and sometimes a little sulphate of lead. The quantities of these, however, especially of the latter, are very inconsiderable; they are in a great measure separated when the acid is diluted, and hence this dilution not only renders it more convenient for administration, but likewise more pure.

As a medicine, this acid is employed as a refrigerant, but principally as an astringent, and in this property it is undoubtedly superior to any other acid. It is used as an astringent to check the flow of blood in hæmoptysis, and the colliquative sweat in hectic fever, indications which it fulfils better than any other article in the Materia Medica. It is sometimes also used in menorrhagia and diabetes; and as a tonic, founded on its astringent property, in dyspepsia. In its concentrated state, its dose can scarcely be measured. In the pharmacopœias, it is therefore ordered to be diluted. According to the formula given by the Dublin and Edinburgh Colleges, the Acidum Sulphuricum Dilutum consists of one part of the strong acid with seven of water; it is given in a dose from ten to thirty drops. The London College, without any sufficient reason for the deviation, have ordered, under the same name, an acid diluted with not much more than five parts of water. The Acidum Sul-

phuricum Aromaticum consists of the acid diluted with alcohol impregnated with aromatics, and is given in a similar dose. From its astringency, this acid is frequently added to gargles, which are employed to check salivation, or relieve relaxation of the uvula. Externally mixed with lard, in the proportion of half a drachm to an ounce, it has been used with advantage in psora, and it has also been given internally in the same disease.

Offic. Prep.—Acid. Sulph. Dil. *Ph. Ed.Lond. Dub.* —Acid. Sulph. Aromat. *Ed.*

ARGILLA. Argil.

THIS earth, in its pure form, is insipid and inert; but in its saline combinations, at least all of them which, from their solubility, are sufficiently active, there exists a greater or less degree of astringent power. The Boles, of which the Armenian Bole(Bolus Armena) is the chief, are argillaceous earth, impregnated with oxide of iron; they were at one time employed as astringents, but are entirely inert, and are now expunged from practice.

SUPER-SULPHAS ARGILLÆ ET POTASSÆ. Alumen. Alum.

THIS is a salt composed chiefly of argillaceous earth and sulphuric acid, the acid being in excess. It likewise always contains, however, a smaller portion of potash, and in some of the forms of it met with in commerce, sometimes also ammonia. It is found native, efflorescing generally in the interstices of what is named alum slate; or it is prepared by exposing alum ores, which are native compounds of argillaceous earth and sulphur, to atmospheric air; the sulphur absorbing oxygen, forms sulphuric acid, which unites with the argillaceous earth, with a portion of potash which the ore contains; or if this alkali is not present in sufficient quantity, either it or impure ammonia is added to the liquor obtained by lixiviation, so as to dispose it to crystallize. This liquor is then concentrated by boiling, so as to obtain, on cooling, the alum in a solid state, of a crystalline structure, though of no regular form.

This salt is in large transparent masses; it has a styptic taste, with a degree of sweetness. From the excess of its acid it reddens the vegetable colours. It is soluble in eighteen parts of cold, and in less than two of boiling water. The variety termed Roche or Rock Alum (Alumen Rupeum) has a reddish colour from the presence of a portion of oxide of iron. Common alum consists of 26 of acid, 12.5 of argil, 10 of potash, and 51.5 of water.

Alum, from its astringent power, is employed to check hæmorrhagies and serous evacuations: it is thus given in menorrhagia, leucorrhœa, and diabetes; and in leucorrhœa, is perhaps more successful than any other astringent. It has likewise been used, though less frequently, in intermittent fever, and in colica pictonum. Its dose is from five to ten grains. The addition of an aromatic is generally necessary, to prevent it from exciting nausea, when it is given in the solid form; but the best form of administering it, is that of Alum Whey (Serum Aluminosum,) prepared by adding two drachms of pounded alum to a pint of hot milk; the dose of this is three or four ounces. Externally alum is frequently used as the basis of astringent gargles, and of injections used in gleet; and dissolved with sulphate of zinc or copper, it forms very styptic solutions, employed to check hæmorrhage by direct application.

Offic. Prep.—Sulph. Alum. Exs. Pulv. Sulph. Alum. C. *Ed.*—Liq. Alum. C. *Lond.*

Calx. Lime. Calx Viva. Quicklime.

Lime is a primary earth, found abundantly in nature in several states of combination. It is obtained by exposing any of the native compounds of it with carbonic acid, usually chalk, limestone, or marble, to a heat gradually raised, so that the acid is expelled, and the lime remains pure. It is soluble in water, in sparing quantity; about seven hundred parts being required for its solution. Yet even in this weak state of impregnation, the solution which is known by the name of Lime Water (Aqua Calcis) has a strong styptic taste, and is

capable of exerting important chemical agencies, as well as of acting on the living system. As an astringent lime water is employed in diabetes, and in diarrhœa: the dose is one or two pounds in the course of the day. It is used likewise in dyspepsia, in which it proves useful, more by its tonic and astringent power, than by its effect in neutralizing acid in the stomach. Externally it is applied as a wash in ill-conditioned ulcers.

Offic. Prep.—Aq. Calc. Ol. Lini cum Calce. *Ed.*

CARBONAS CALCIS. Carbonate of Lime.

THE various kinds of carbonate of lime, Chalk, (Creta Alba,) Crabs Claws (Chelæ Cancrorum,) Oyster Shells (Testaæ Ostreorum,) are not unfrequently used in diarrhœa but they evidently prove useful, not by any real astringent power, but by correcting the acidity which so frequently occasions or aggravates that disease. They rather belong, therefore, to the class of antacids.

FERRUM. Iron. (Page 174.)

THIS metal has been already considered as a tonic: it is likewise employed as an astringent to check increased evacuations. It is thus used with advantage in some forms of passive hæmorrhage, particularly menorrhagia. The advantages derived from it in such cases, may be supposed to depend on its tonic power; the styptic taste, however, of its saline preparations, is a sufficient proof of the presence of astringency to a certain extent; and it is not improbable that this may coincide with, or modify the operation connected with its action as a tonic. The sulphate of iron is the preparation in which this astringent property is most obvious.

ZINCUM. Zinc. (Page 177.)

THIS metal has likewise been considered as a tonic. Its saline preparations have, however, a considerable degree of astringency, and there are several medicinal applications of them founded on this quality.

Sulphate of Zinc (Sulphas Zinci) has been employed

internally as an astringent in chronic dysentery, and in the treatment of intermittent fever : but from its emetic power, its operation is liable to be harsh, and is not easily regulated. Its solution is in common use as an injection in gonorrhœa, when the inflammatory state has subsided, and in gleet ; two grains being dissolved in an ounce of water, and it frequently succeeds in checking the discharge, apparently from its astringent power. A solution of nearly the same strength is likewise used as a collyrium in ophthalmia ; the astringent power of this being increased according to a formula in the Edinburgh pharmacopœia, by the addition of a few drops of diluted sulphuric acid. Dissolved with alum, it forms a very styptic liquor, which has long been in use for stopping hæmorrhage, and checking increased discharges by external application.

Offic. Prep.— Sol. Sulph. Zinc. *Ph. Ed.*—Liq. Alum. Comp. *Ph. Lond.*

Acetate of Zinc, under the form of solution (Solutio Acetitis Zinci,) is obtained by adding a solution of acetate of lead to a solution of sulphate of zinc, a decomposition immediately taking place, and sulphate of lead being precipitated, while acetate of zinc remains dissolved. This has long been in use as a mild astringent injection in gonorrhœa, less liable to produce irritation, or to check the discharge suddenly than the solution of sulphate of zinc, and rather more active than the solution of acetate of lead. It has therefore received a place in the Edinburgh pharmacopœia. A solution of the salt in alcohol has been introduced into the Dublin pharmacopœia, and when used is largely diluted with water.

Cuprum. Copper. (Page 179.)

This metal has so far an analogy to the preceding ones, that, along with the general action which it exerts on the system, capable of obviating spasmodic affections, it has a degree of astringent power. This too is conspicuous, principally in its combination with sulphuric acid, the sulphate of copper. This in solution is some-

times used externally as an astringent; and dissolved with alum in water, to which a portion of sulphuric acid is added, it forms a very styptic solution, formerly named Aqua Styptica, sometimes employed by direct application to restrain hæmorrhage. The formula has a place in the Edinburgh pharmacopæia.

Offic. Prep.—Sol. Sulph. Cupr. Comp. *Ph. Ed.*

Plumbum. Lead.

This metal, when rendered capable of acting on the system by oxidation, or combination with acids, produces very deleterious effects, and proves a powerful, though insidious poison. Nor is it easy to explain its mode of action. It appears to act peculiarly on the muscular fibre, repressing action, and at length exhausting the irritability of the muscles. When introduced slowly into the system, the intestines are first affected, constipation from diminished action takes place, accompanied frequently with severe pain. Tremor and debility of the voluntary muscles succeed, and are followed by complete paralysis, the muscles losing their firmness and cohesion. When a large quantity of any of the active preparations of lead is received into the stomach, these symptoms occur suddenly and with violence, giving rise to what is named Colica Pictonum, and the same disease is sometimes suddenly induced by the progressive accumulation of the metal in smaller quantities. A sense of constriction is felt in the stomach and bowels, with obstinate constipation and the most severe pain; the pulse is small and hard; respiration becomes laborious; there is general muscular debility and tremor, accompanied with cold sweats and convulsions, which have often a fatal termination.

From this power of repressing muscular action, lead produces effects analogous in some respects to those of astringents, and it is regarded as an astringent, though its mode of operation is probably dissimilar. The preparations of it which have been applied to medicinal use,

are the semi-vitrified oxide white oxide or sub-carbonate, the acetate and super-acetate.

LITHARGYRUM. Litharge. The substance thus named is the semi-vitrified oxide (Oxidum Plumbi Semi Vitreum.) It is usually obtained in the calcination of lead, with the view of separating the silver, which is frequently associated with it; the flame, with a current of air, being made to reverberate on the surface of the melted metal. It is in flakes of a yellow colour, with somewhat of a vitreous lustre. A small quantity of carbonic acid, not exceeding 4 parts in 100, exists in it, apparently, however, not essential to its constitution. It is used only in some pharmaceutical preparations particularly for forming, when boiled with oil, a plaster which serves as the basis of other compound plasters, and which is itself sometimes applied as a healing dressing to wounds, proving useful by excluding the air.

Offic. Prep.—Emp. Oxid. Plumb. *Ph. Ed. Lond. Dub.*

MINIUM. Red Lead.—This is an oxide containing about 12 of oxygen in 100 parts. It is sometimes applied to the same purposes as litharge, and an ointment formerly in use as a cooling application was prepared by rubbing it with vinegar and oil. It might be discarded, however, from the pharmacopœia.

CERUSSA. Cerusse, or White Lead.—This is prepared by exposing plates of lead to the vapour arising from vinegar; a white crust is formed on their surfaces, which, when it has accumulated sufficiently, is scraped off, and reduced to a fine powder by levigation. The nature of this substance has not been very well ascertained. It has been regarded merely as an oxide; hence the name Oxidum Plumbi Album, given to it by the Edinburgh College. A little carbonic acid being generally contained in it, either absorbed from the atmosphere, or formed from the partial decomposition of the acetic scid, it has been considered as a sub-carbonate; and the London College have defined it as such, while,

for a reason not easily imagined, they have named it Carbonas Plumbi. From theory, it might be inferred to contain a portion of the acetic acid by which it is formed; the Dublin College have accordingly named it Sub-Acetas Plumbi, and it is not improbable that this is most correct. It is used only externally, being applied in fine powder to slight cases of excoriation or inflammation, and used particularly to relieve these affections in children,—a practice, however, which, from some observations, appears not to be altogether without danger, and which is unnecessary, as the levigated calamine stone answers equally well. It is used likewise as the basis of an ointment, which is sometimes applied as a cooling dressing to inflamed parts.

Offic. Prep.—Ungt. Oxid. Plumb. Alb. *Ph. Ed.*

Acetas Plumbi. Acetate of Lead.—There are two compounds of lead with acetic acid, medicinally employed. One is the salt which has been long known by the name of Sugar of Lead, (Saccharum Saturni,) the other a solution, which was named Goulard's Extract of Lead; and it is only lately that the relation between these has been established.

The first had been regarded as the proper acetate of Lead. Thenard found, that it is the super-acetate, or contains an excess of acid, which is necessary to give it its usual crystalline form, which is that of a slender four or six sided prism. When its solution is boiled with a little oxide of lead, the neutral acetate is formed, which crystallizes in plates. Goulard's Extract, which is prepared by boiling vinegar on litharge, Dr. Bostock found to be a solution of the natural acetate. And the terms of Acetate and Super-acetate are now employed by the London College to distinguish these preparations.

Super-Acetas Plumbi. Super-Acetate of Lead. This is still named Acetate of Lead (Acetas Plumbi) in the Edinburgh pharmacopœia, the nature of it having only lately been ascertained. It is the sugar of lead of the old nomenclature. The process for preparing it

consists in boiling vinegar on cerusse, until the acid acquire a sweet taste, and evaporating the liquid, so that on cooling it affords crystals; it is usually prepared on a large scale. It is in masses composed of slender prismatic crystals, aggregated, of a yellowish colour, slightly efflorescent; it has a very sweet and styptic taste, is abundantly soluble in water, but scarcely forms a transparent solution even with distilled water, owing to a slight decomposition, in consequence of which a little sub-acetate is precipitated. It consists, according to Thenard's analysis, of 58 of oxide, 26 of acid, and 16 of water.

The medicinal use of this salt is nearly limited to its external application. Yet some practitioners have recommended it in different cases of profuse evacuation, particularly in hæmorrhage, where other remedies have failed; it has thus been given in menorrhagia, in the dose of half a grain repeated every four hours: it has likewise been employed in obstinate leucorrhœa, and to restrain the colliquative sweat accompanying hectic fever. From the deleterious agency, however, of lead on the system, it is a remedy which must be used with reluctance, and which is accordingly scarcely ever ventured on in modern practice. There is one circumstance too, that renders its administration more difficult,—its being liable to be considerably influenced by idiosyncrasy; many facts having sufficiently established, that its action is extremely unequal, quantities of it having been often taken without any injurious effect, which, in other cases, would have proved in the highest degree deleterious.

As an external application, it is often employed to obtain its astringent effect. A solution of it of the strength of three grains to an ounce of water, is used as an injection in gonorrhœa; and producing no irritation, is not liable to be attended with the injurious consequences which sometimes arise from preparations more active. A solution rather weaker is employed as a colly-

rium in ophthalmia, and can be applied with safety, even in the state of active inflammation. A solution somewhat stronger is a common application in superficial inflammation; and an ointment, of which it is the basis, is often employed as a dressing to inflamed or excoriated parts. Its saturated solution, combined with vinegar, is also frequently employed as a discutient. Facts have been brought forward, which apparently prove, that the general effects of lead on the system have been produced by the incautious or too long continued use of these external applications: while, in many cases, they have unquestionably been extensively employed without the production of any bad effect, and indeed are so in common practice; the opposite facts, therefore, if the observations with regard to them have been correct, are probably to be accounted for from the peculiar idiosyncracy, which, as has been remarked, exists with regard to the action of lead on the system, in consequence of which some individuals are more liable to be affected by it than others.

The neutral acetate of lead, it has been stated above, forms the basis of what has been named Goulard's Extract,—a preparation which has long been in use among surgeons. It is the Aqua Lithargyri Acetati of the former edition of the London College, now named Liquor Plumbi Acetatis; and prepared by boiling vinegar on litharge. Although it differs in chemical composition from the preceding preparation, it does not appear to differ from it in medicinal powers. It is used diluted with water, as a lotion in cutaneous diseases, or as an application to inflamed surfaces. In the original formula for the preparation of this lotion given by Goulard, a little ardent spirit was added to it, and this being in common use has been received as an officinal preparation by the London and Dublin Colleges.

Offic. Prep.—Ungt. Acet. Plumb. *Ph. Ed. Lond. Dub.*—Liq. Plumb. Acet. Dilut. *Ph. Lond. Dub.*—Cerat. Plumb. Composit. *Ph. Lond.*

OF VEGETABLE ASTRINGENTS.

THE property of astringency in vegetables, denoted by its effect of corrugating the animal fibre, appears to be dependant on a common chemical principle, or at least to be connected with some peculiarity of composition; since vegetable astringents uniformly possess certain common chemical properties. Thus their astringency is extracted both by water and by alcohol; these infusions strike a purple or black colour with any of the salts of iron, deeper in general as the astringent is more powerful; and they are capable of corrugating, more or less strongly, dead animal matter, as is shown in their operation in the process of tanning.

In the farther investigation of this subject, it was found, that a peculiar acid exists in the more powerful astringents; the acid which, from being contained abundantly in galls, has been named Gallic, and the general chemical characters of which, in the preliminary sketch on the principles of Pharmaceutic Chemistry, have been enumerated. This acid having the property of striking a deep purple colour with the salts of iron, the chemical change which had been more particularly considered as the test of astringency, was supposed to be the astringent principle.

To this, however, there existed a very obvious objection, that the acid, when obtained insulated, was possessed of no great astringency, and scarcely indeed of that property in any sensible degree; and farther, that the colour it did strike with the salts of iron was less deep than that from the infusions of the more powerful astringents.

The researches of Seguin, some years ago, threw more light on this subject by the discovery of a different principle existing in astringents, and having a better claim to be ranked as the principle of astringency. Applying the proper test to discover it, that of the animal

matter, on which it peculiarly operates, he found, that on adding a solution of animal gelatin to the infusion of a vegetable astringent, as that of galls or oak bark, a copious precipitation takes places, consisting of this principle in combination with the gelatin. Being the agent which gives to astringents their property of tanning, it has received the name of Tannin, and its properties, as a proximate principle of vegetables, have been already stated.

That it is the principle of astringency in vegetables, admits now of little doubt. Gallic acid has no such power, while tannin has a harsh styptic taste, and the power of corrugating the animal fibre. Seguin had supposed, that in the operation of tanning, its action is facilitated by that of the gallic acid, the acid partially deoxidising the skin, and thus bringing it nearer to the state of gelatin with which the tannin combined. A similar action might be supposed to be exerted on the animal fibre in the production of the astringent effect. The theory of Seguin, however, was established by no proof, and the fact alone that some of the most powerful astringents, as catechu or kino, contain no gallic acid, but tannin mixed only with mucilage, or extract, is a proof that it is to the action of this principle that the whole effect is to be ascribed.

If astringency, as exerted by vegetables, is thus to be considered as the result of the chemical action of the principle on which it depends, there is considerable difficulty, as has been already remarked, in conceiving how it can be exerted in the animal system, especially in a distant part, when the astringent acts only on the stomach. It can only be conceived, that corrugation, or some similar change, is produced by it in the fibres of the stomach, which may be propagated by sympathy to distant parts, nearly in the same way as the impression of cold is communicated.

QUERCUS ROBUR. Oak. *Monoec. Polyand. Amentaceæ. Cortex. Indigenous.*

THE bark of this tree possesses a large share of astringency which it yields to water. The infusion contains both gallic acid and the tanning principle, the latter in a considerable quantity, attached to the ligneous fibre, which forms the basis of the bark; an ounce of bark afforded, in Mr. Davy's experiments on the principal astringents, 111 grains of solid matter by lixiviation, of which 77 were tannin.

Oak bark has been used as a remedy in hæmorrhage, diarrhœa, and intermittent fever, given in a dose from 15 to 30 grains. In modern practice, its strong infusion or decoction is occasionally employed as an astringent gargle in cynanche, as an injection in leucorrhœa and profuse menorrhagia, and as a fomentation in hæmorrhoids and prolapsus ani.

Offic. Prep.—Extr. Cort. Querc. *Dub.*

QUERCUS CERRIS. *Monoec. Polyand. Amentaceæ. Cyniphis nidus. Galla. Galls. South of Europe.*

THE tubercles, named Galls, are found on the branches of this tree. Their production is occasioned by the bark being pierced by an insect of the cynips genus, to deposite its egg. The juice exuding slowly, is inspissated, and hardens. The best galls are heavy, knotted on the surface, and of a blue colour. They are nearly entirely soluble in water, at least with the assistance of heat; the infusion reddens the vegetable colours from the action of the gallic acid, and this acid can be procured in considerable quantity by allowing the infusion to remain exposed to the air, until its other principles are decomposed, or by sublimation from the galls. The infusion too contains a large quantity of tannin, as it gives a very copious precipitate with solution of gelatin. It has farther been supposed to hold dissolved extract and mucilage; but the existence of extract is doubtful, and from Dr. Bostock's experiments,

there appears to be no sensible portion of mucilage. The proportion of tannin varies considerably in different specimens of galls. In Mr. Davy's analysis of Aleppo galls, 500 grains afforded to water by lixiviation 185 grains of solid matter, of which 130 were tannin, 31 gallic acid, 12 saline and earthy matter, and 12 supposed to be mucilaginous and extractive matter.

In medical practice, galls though so powerfully astringent, are not much employed, and are seldom internally administered. The strong infusion or decoction has been applied to the same purposes as the decoction of oak bark. And an ointment composed of the galls in fine powder with eight parts of simple ointment is used as an astringent application to hæmorrhoidal affections.

Offic. Prep.—Tinct. Gallar. *Ph. Dub.*

TORMENTILLA ERECTA. Tormentil. *Icosand. Polygyn. Senticosæ. Radix. Indigenous.*

THE root of tormentil is strongly astringent, with little flavour or bitterness, and though not chemically examined, probably owes its astringency to tannin. It has been used in diarrhœa, under the form of decoction, and in intermittent fever, in substance, in the dose of from half a drachm to a drachm. But it is now nearly discarded from practice.

POLYGONUM BISTORTA. Bistort. *Octand. Trigyn. Oleraceæ. Radix. Indigenous.*

THE root of this plant is a pure and very strong astringent; as such it has been used in diarrhœa and in intermittent fever, in a dose from a scruple to a drachm. But having probably no superiority over other astringents, and no peculiar virtue, it has fallen into disuse.

ANCHUSA TINCTORIA. *Alkanet. Pentand. Monogyn. Asperifoliæ. Radix. South of Europe.*

THE cortical part of the root of this plant has a deep red colour, which has the singular property of not being extracted either by water or alcohol, but readily by ex-

pressed oils. It possesses a slight degree of astringency; but it is now only employed to communicate colour to ointments.

HÆMATOXYLON CAMPECHIANUM. Lignum Campechense. Logwood. *Decand. Monogyn. Lomentaceæ. Lignum. South America.*

THE wood of this tree is of a very deep red colour; it has scarcely any smell; its taste is sweetish and astringent. Its active matter is extracted by water, and by alcohol, leaving the ligneous fibre which is its base undissolved; both solutions strike a deep purple colour with the salts of iron, and give a precipitate with gelatin. Logwood has been employed in medicine as an astringent, in diarrhœa and chronic dysentery, under the form of the decoction, or the watery extract. The extract has been proposed to be used as a substitute for kino.

Offic. Prep.— Extr. Hæmatoxyl. Camph. *Ph. Ed. Dub. Lond.*

ROSA GALLICA. Rosa Rubra. Red Rose. *Icosand. Polyg. Senticosæ. Petala. South of Europe.*

THE petals of this species of rose have a slight degree of astringency, which is most considerable before they are expanded, and it is in this state that they are collected and dried for use. The fresh leaves of the flowers are made into a conserve with sugar, which was at one time regarded as a remedy of some power in hæmoptysis and phthisis, but which has long been acknowledged to be perfectly inert. The infusion of the dried leaves, slightly acidulated by the addition of sulphuric acid, forms a pleasant astringent gargle.

Offic. Prep.—Inf. Ros. Gall. Cons. Ros. R. Syr. Rosæ. *Ph. Ed.*—Mel. Rosæ. *Lond. Dub.*

ARBUTUS UVA URSI. Bear's Whortle-Berry. *Decand. Monog. Bicornes. Folia. Europe, America.*

THE leaves of this plant have a bitter astringent taste, without any odour. Their watery infusion strikes a deep black colour with the salts of iron, and from their

known astringency, which adapts them even to the purpose of tanning, probably contains a lage proportion of tannin.

From its astringency, uva ursi has been employed in menorrhagia and other fluxes. It has however been used more particularly in cystirrhœa, calculus, and ulcerations of the urinary organs. In checking the increased secretion of mucus from the bladder, which constitutes the first of these diseases, it appears to be superior to other astringents ; to calculus, in common with other bitters and astringents, it affords relief, probably by its action on the stomach preventing the generation of acid. More lately it has been recommended in phthisis. Its dose is half a drachm of the leaves in powder, twice or thrice a-day.

MIMOSA CATECHU. *Polygam. Monoec. Lomentaceæ. India. Ligni Extractum. Catechu. Terra Japonica.*

To this substance, formerly known by the absurd name of Japan earth, the application of catechu is now appropriated. It is an extract prepared by boiling the inferior wood of the tree with water, and the tenacious residual mass is dried by exposure to the air and sun. It is of a yellow or brown colour, has a bitter and astringent taste, leaving an impression of sweetishness ; but its qualities vary considerably. Two kinds are at present met with in the shops ; one is of a light yellowish brown colour, is smooth and uniform in texture, breaks short, is soft and light ; the other is of a dark brown colour, more heterogeneous, heavier, and considerably harder.

Catechu is almost entirely soluble in water with the assistance of heat, the residuum consisting of accidental impurities. It is nearly equally soluble in alcohol. Its solution strikes a deep black colour with the salts of iron, and gives an abundant precipitate with animal gelatin. From Mr. Davy's experiments, it appears to be composed of tannin, extractive matter and mucilage ; the proportions in the best catechu being 54.5 of the first, 34 of the second, 6.5 of third, and 5 residual matter. Our knowledge with regard to the principle named

Extract is so imperfect, that it is difficult to establish any certain conclusion with regard to it; and the subsequent experiments of Dr. Bostock, as to the modes of separating what is called Extract from the Tannin of catechu, do not exactly accord with those of Mr. Davy. Dr. Bostock has remarked, too, that catechu gives indications of the presence of gallic acid, and that its watery infusion even reddens the more delicate vegetable colours.

Catechu is in common use as an astringent, and in the uniformity and certainty of its operation is probably equal, or even superior to any of the vegetable astringents. It is used in diarrhœa generally under the form of the infusion, or the tincture: or the officinal preparation, the electuary of catechu, consisting of catechu and kino with some aromatics and a little opium is diffused in water, forming what has been named the Japonic Mixture. In substance it may be given in a dose from 10 to 20 grains, which may be frequently repeated. Under the form of troches, it is sometimes used in relaxation of the uvula, or sponginess of the gums, being allowed to dissolve slowly in the mouth.

Offic. Prep.—Elect. Catechu. Inf. Catech. Tinct. Catech.—*Ph. Ed. Lond. Dub.*

Kino.

The substance distinguished by this name was introduced a number of years ago into the Materia Medica as a powerful astringent, little being known with regard to its origin, farther than it was said to be the produce of Africa, and obtained probably from the plant affording it by exudation. Subsequent to its introduction, it was met with in the shops very various in its qualities: it still is so, and is obviously of different origin, though there is considerable obscurity with regard to the natural history of these varieties. The London College have described it merely as the produce of an African plant unknown.—The Edinburgh College have inserted it in their catalogue of simples, as the concrete juice of the

Eucalyptus Resinifera,—a tree a native of New Holland; and there is reason to believe that at least part of what is called Kino in the shops is imported from that country, and is the produce of this vegetable. The Dublin College have considered kino as the product of the Butea Frondosa, on the authority of Roxburgh; but incorrectly, as Dr. Duncan has remarked. He has farther observed, what is perfectly just, that much of the kino of the shops bears all the appearance of an extract artificially prepared, and it is known to be formed from different astringent vegetables.

It is not very easy to discriminate exactly among these various substances, and to assign to each its real origin. One variety, and which bears the highest price in the shops, has all the appearance of a natural production: slender twigs are intermixed in its substance; it is of a reddish brown colour, with a resinous lustre, is very brittle, and has a bitterish astringent taste. This corresponds in its characters with the substance first introduced as kino, and is still said to be the produce of Africa, and to be imported from Senegal. The kind from New Holland has also the appearance of a natural production, fragments of bark being intermixed with it; it is in more solid masses than the other, is less brittle, and with its astringency has a disagreeable mawkish sweetish taste. The third kind, and which is most commonly met with, has the appearance of an extract thoroughly dried; it is in small fragments, with a resinous fracture, is of a brown colour, more approaching to black than the others, and has a taste astringent and slightly bitter. This Dr. Duncan has stated is said to be the produce of the Coccoloba Uvifera. I have also been informed, that it is the Extract of the wood of the mahogany.

The analysis of kino has been executed; but from the difficulty of ascertaining exactly to what substance the name is applied, there is a difficulty in appropriating the results to any of the varieties that are met with. All of them however, appear to contain a large proportion

of tannin; their solutions giving a deep colour, not purple however, but green, with salts of iron, and a copious precipitate with gelatin. The active matter of all or the greater number of them is soluble in water with the assistance of heat, and is still more easily soluble in alcohol.

Kino has been employed as an astringent for the same purpose as catechu, and they are often given in combination. The catechu being more uniform in its qualities, ought perhaps to be preferred.

Offic. Prep.—Tinct. Kino. *Ph. Ed. Lond. Dub.*—Pulv. Kino. Comp. *Lond.*

PTEROCARPUS DRACO. Sanguis Draconis. *Dragon's Blood. Diadelph. Decand. Papilionaceæ. Resina. South America.*

THE substance to which the absurd name of Dragon's Blood has been given, is a resinous concrete of a dark red colour, and heterogeneous texture, varying also frequently in its qualities as it is met with in the shops. It is insipid; and though it has been considered as an astringent, has probably no such power, nor is it now applied to any medical use.

PISTACIA LENTISCUS. Mastiche. Mastich. *Dioecia. Pentand. Amentaceæ. Resina. South of Europe.*

THE resin named Mastiche is the produce of this shrub by exudation. It is in small rounded fragments of a light yellowish colour, nearly transparent, brittle, and hard, but when pressed or chewed becoming somewhat tenacious. It is chiefly resinous, and is hence dissolved by alcohol, a substance however remaining undissolved, tenacious and elastic, approaching in its characters to caoutchouc. Mastiche is insipid, and nearly inodorous, giving only a slightly fragrant smell when heated. Though it has been regarded as an astringent, and as such was at one time employed in medical practice, it has no sensible activity, and might be discarded from the lists of the Materia Medica. It is used from its insolubility and tenacity to fill the cavity in carious teeth.

SECOND DIVISION.

OF LOCAL STIMULANTS.

UNDER this division is comprehended those remedies, the stimulant operation of which is directed to particular organs. This comprises Emetics, Cathartics, Diuretics, Sialagogues, and those various other classes that have usually been arranged under the title of Evacuants, their local operation giving rise to increased secretion, or increased evacuation.

CHAPTER VII.

OF EMETICS.

EMETICS are defined, Medicines which excite vomiting, independant of any effect arising from the mere quantity of matter introduced into the stomach. This definition, however, requires to be still more limited; for there are many substances which occasionally induce vomiting, that are not usually ranked as emetics. All bitter and nauseous drugs have this effect, when given in large doses, or in an irritable state of the stomach; and it occurs frequently as the consequence of the action of many stimulants and narcotics. The emetic operation, however, from these causes, is neither uniform nor certain: there is, on the contrary, a number of substances, many of which have no very nauseous taste, or which can have that taste concealed, but which still excite vomiting when given in a sufficient dose in

every individual, and in every state of the stomach. To these substances the appellation of Emetics is exclusively applied. They may therefore be defined, Substances which excite vomiting, independant of any effect arising from the quantity of matter introduced into the stomach, of any nauseous taste or flavour, or of any narcotic or acrid power.

When an emetic has been given in a proper dose, the stomach remains for sometime undisturbed. But in 10, 15, or 20 minutes, an uneasy sensation, with nausea, supervenes, which continues increasing until vomiting begin. While the nausea only is present, the countenance is pale, the pulse is feeble, quick and irregular, and there is a feeling of cold; but during the action of vomiting, the face becomes flushed, the pulse is quickened, though still feeble, and remains so in the interval of vomiting. The vomiting generally recurs twice or thrice, and then ceases; a degree of nausea remains, which goes off only gradually; there is a degree of langour, and often a disposition to sleep; the pulse is weak and slow, but becomes gradually fuller; the skin is usually moist.

The general theory of the operation of vomiting is sufficiently evident. The vermicular or peristaltic motion of the stomach, by which the food is propelled through the pylorus, is inverted; the diaphragm and abdominal muscles are called into action by association; the pylorus is contracted, and the contents of the stomach are forcibly discharged upwards. In many cases of vomiting, especially when violent, the peristaltic motion even of the upper part of the intestinal canal is also inverted, and bile is brought into the stomach from the duodenum.

At the same time, it is very difficult to explain how the peristaltic motion is inverted by emetics. It is a singular fact, that any substance acting as an unusual stimulus to the stomach, seldom increases its motion, so as to occasion a more speedy discharge of its contents by the pylorus. The motion, instead of being increased, is

more commonly inverted, and hence vomiting is the effect peculiarly resulting from such local stimulantaction. Nor is it easy to assign any cause for this specific operation.

Dr. Darwin gave a different explanation of the nature of vomiting. He considered it as the effect, not of increased, but of decreased action of the fibres of the stomach. When an emetic is administered, it produces, he observes, the pain of sickness, as a disagreeable taste in the mouth produces the pain of nausea; these uneasy sensations not being acutely painful, do not excite the organ into greater action, but rather repress the motions already existing. The peristaltic motion of the fibres of the stomach becomes languid from the want of the usual stimulus of pleasurable sensation, and in consequence stops for a time, and then becomes inverted, which gives rise to the phenomena. In this theory, there is however equally a deficiency in explaining how the inversion of the motion is effected.

There is a considerable difference among individuals with regard to the facility with which vomiting is excited. This susceptibility is also liable to be altered by disease. In the greater number of febrile affections, vomiting is easily excited; while in several of the diseases of the class Neuroses, as mania, melancholia and hypochondriasis, it is excited with much more difficulty. In the case of poisons, which induce inflammation of the stomach, vomiting is almost a constant symptom; while in those which act by a narcotic power, and in which the irritability of the stomach is impaired, a very powerful emetic is required to produce any effect.

Although nausea or sickness generally accompanies vomiting, this connection is not a necessary one. Some emetics, as sulphate of zinc, act without occasioning much nausea; while others, as tobacco, excite it in a greater degree than is proportioned to their emetic power,—a circumstance sometimes requiring to be attended to in the administration of individuals of this class.

The feeble and low state of the pulse, which attends vomiting, has been ascribed either to direct association between the motions of the stomach and those of the heart; or to the nausea excited, which, like other disagreeable sensations not acutely painful, have a depressing effect, being equivalent probably to an abstraction of stimulus.

Emetics, at least those which are mild in their operation, do not appear to waste the irritability of the stomach: they have rather an opposite effect: hence digestion is often vigorous after vomiting, and hence too gentle emetics are often serviceable in dyspepsia, and in the temporary diminished tone of the stomach occasioned by intoxication.

The state of the stomach produced by vomiting seems to be often extended to the vessels of the skin; it is therefore followed frequently by diaphoresis, and is one of the most powerful means of removing spasmodic stricture from the surface of the body.

Emetics have a remarkable power of increasing absorption; hence the benefit they afford in anasarca, and the sudden disappearance of tumors which sometimes happens after violent vomiting.

Emetics frequently occasion increased evacuation from the intestinal canal; and if they fail to excite vomiting, very generally operate as cathartics. Some are more apt to have this effect than others, as the preparations of antimony compared with ipecacuan.

From the different indications which emetics are capable of fulfilling, they are adapted to the treatment of many morbid affections.

Where disease depends on a disordered state of the stomach, arising from over-distention, the presence of acrid or indigestible matters, or any other cause, vomiting is the easiest and most effectual mode of affording at least present relief. Hence its utility in all cases of indigestion, impaired appetite, acidity in the stomach, pyrosis, or anorexia; in the symptoms arising from intoxication, and where poisons of any kind have been swallowed.

From the strong action of the diaphragm and abdominal muscles in vomiting, the gall bladder and hepatic ducts are emptied of their contents; and hence jaundice, owing to obstruction from biliary calculi, is sometimes suddenly relieved by vomiting. A similar pressure is supposed to be exerted during vomiting on the thoracic viscera, and from this has been explained the expectorant effects of emetics, and the relief they afford in some varieties of asthma and catarrh.

In the different varieties of febrile diseases, much advantage is derived from the administration of an emetic, especially in the commencement of the disease. In synocha, where there are symptoms of highly increased action, and particularly where there is determination of blood to the head, full vomiting may be attended with some danger; and in typhus fully established, it cannot be expected to be of much benefit. In the slighter cases of pyrexia, it is often attended with marked advantage. The emetic should be given in the evening, as its operation leaves a tendency to sleep, and to diaphoresis, which it is useful to promote.

At one time, the practice of giving emetics in fever in such doses as to excite nausea without producing vomiting was common. It is more distressing to the patient, and does not appear to be equally effectual in stopping the progress of the disease. This mode, however, of giving nauseating doses of emetics, is often useful in hæmorrhage, where full vomiting would be dangerous; the nausea excited diminishes the force of the circulation, and hence it is sometimes employed in hæmoptysis and menorrhagia.

From the powerful effects of emetics, their improper administration may be extremely hurtful, and there are various states of the system which either prohibit their use, or allow them to be employed only with caution. During the operation of vomiting, the blood returns with more difficulty from the head, owing partly to the pressure on the descending aorta, and partly to the interrupted respiration, by which the transmission of blood

through the lungs is impeded; hence the redness of the countenance, and the vertigo which sometimes accompany it. From this cause it must be attended with danger in all cases where there are symptoms of determination to the head, and more especially in plethoric habits. From the strong action of the abdominal muscles exerted in vomiting, it has been considered as not without risk in visceral inflammation, in the advanced stage of pregnancy, and in hernia and prolapsus uteri. In extreme debility, there is danger of the patient sinking under the violence of the operation. The frequent repetition of emetics in chronic diseases is in general prejudicial, by weakening the tone of the stomach, and rendering its motions more liable to be inverted by slight causes.

The mode of administering emetics does not admit of many general observations. They should be given in the form of draught; as if in a solid form, the emetic might pass from the stomach into the intestines, without exciting vomiting. A common practice is to promote the action of emetics by taking large draughts of tepid water, or of an infusion of chamomile. If an emetic is given in a large dose, this is not necessary, as it will excite vomiting repeatedly at intervals; but if given in a moderate dose, it may excite vomiting only once; nausea and efforts to vomit will recur, however, at intervals, and then vomiting may be renewed by a draught of tepid water, or of a bitter infusion. We thus obtain the advantages of repeated vomiting, without the risk attending a large dose of a powerful emetic. Too large a draught ought not to be taken, as it renders the operation more difficult or painful. Some acrid emetics, however, as mustard, require always to be largely diluted.

The most natural subdivision of this class is into Emetics from the Vegetable, and from the Mineral Kingdom.

EMETICS.

FROM THE MINERAL KINGDOM.

ANTIMONIUM.
ZINCUM.
CUPRUM.

AMMONIA.
HYDRO-SULPHURETUM AMMONIÆ.

FROM THE VEGETABLE KINGDOM.

CALLICOCCA IPECACUANHA.
SCILLA MARITIMA.
ANTHEMIS NOBILIS.
SINAPIS ALBA.
ASARUM EUROPÆUM.
NICOTIANA TABACUM.

EMETICS FROM THE MINERAL KINGDOM.

ANTIMONIUM. Stibium. Antimony.

THE metal to which this name is appropriated, is peculiarly distinguished as an evacuant, and under various forms of preparation furnishes some of our most powerful cathartics, diaphoretics, and expectorants. All its

preparations in larger doses act as emetics, and several of them are in common use for their emetic power. It is therefore under this class that its general history may be introduced.

Antimony, in the modern chemical nomenclature, is the name applied to the pure metal. This metal is found in nature most abundantly combined with sulphur, and to this ore the name of antimony was once generally given by medical and chemical writers; the epithet Crude being frequently added to distinguish it, when it is melted out from the impurities mingled with it. The ore in this state is now named Sulphuret of Antimony, and the simple name Antimony is appropriated to the metal itself.

The native sulphuret is of a gray or blue colour, with metallic lustre; it is opaque, and has usually a striated texture. To free it from the earthy matter with which it is mixed, when dug from the vein, it is fused. Its lustre is greater the more completely it is purified. The proportions of its principles are various; sometimes they are nearly equal; in other specimens the quantity of metal is larger; and there are some varieties unfit for medicinal use, as containing other metals, particuly lead, and sometimes copper. These have inferior lustre, and a less distinctly striated texture.

The pure metal is usually obtained from the ore by melting the latter with iron-filings, the iron combining with the sulphur, while the antimony, being very fusible, is run out. The metal is of a bluish white colour, and plated texture, moderately hard, and very brittle; it melts easily, and is even volatilized by a heat not very intense; it is oxidated by exposure to the air at a temperature moderately increased; and in the state of oxide, it is capable of combining with the greater number of the acids.

The sulphuret of antimony has little activity, and indeed produces scarcely any sensible effect on the system. The preparations of the metal are much more active,

and though of very different degrees of strength, ratain the same general mode of action, and possess therefore, the same medicinal virtues. They do not exert any general stimulant operation on the system, but are always directed in their action to particular parts, so as to occasion some sensible evacuation.

The principal general medicinal application of antimony in these preparations has been for the cure of febrile affections. It is given either so as to induce vomiting or purging, or sometimes in smaller doses, so as to produce only gentle diaphoresis ; and exhibited in either mode in the commencement of the disease, it has been considered as capable of cutting short its progress. The use of James' powder, wich is an antimonial, has been extensive with this view, and both it, the emetic tartar, and other antimonials, are still employed. Their efficacy has usually been ascribed to the evacuation they occasion, while others have considered antimony, apparently with little reason, as exerting an action specific or peculiar in itself in the cure of fever, and not explicable on the known effects it produces. Its administration is not easily regulated with precision, in small doses it often fails in producing the favourable crisis expected from its operation ; and in larger doses it is liable to act with violence and produce evacuations under which the powers of the system have sunk. It is principally in the commencement of fever that advantage is derived ; in the more advanced stages, when the state of debility is induced, more hazard attends its employment, and less advantage is to be expected from it.

Antimonials have been found to have good effects in intermittent as well as in continued fever, in several of the phlegmasiæ and exanthemata, and even in several of the profluvia, probably from their evacuating operation.

As an emetic, antimony is distinguished by the certainty, extent, and permanence of its operation. The action it excites in the stomach is both more forcible, and continues for a longer time, than that from other

emetics, and hence it produces more complete evacuation, and occasions in a greater degree all those effects which result from the action of vomiting. Its action is also less local. It is generally extended to the intestinal canal, so as to produce purging, and very frequently to the surface of the body, so as to occasion diaphoresis or sweat. It is used more particularly where the effects of full vomiting are required; but where these are not wished for, more gentle emetics are usually preferred.

Of the preparations of antimony, it is necessary to take only a very cursory view, as they are to be more fully noticed in another part of the work. They may be arranged under those in which the metal is combined with sulphur; those in which it is oxidated; and those in which it is brought into a saline state by combination with acids.

Of the first, the Levigated Antimony (Antimonium Præparatum,) which is merely the native sulphuret reduced to a state of mechanical division, is the only preparation. It has been given as a diaphoretic, especially in chronic rheumatism, and in some cutaneous affections, in a dose from fifteen grains to one drachm; but it is so inert and uncertain, that it is now discarded from practice.

The oxides of antimony are more active, but they are liable to the inconvenience of being uncertain in their operation, partly perhaps from their activity being dependant on the state of the stomach with regard to acidity, partly from the various degrees of oxidation in which they may exist, and which are not easily rendered uniform, and partly too from their state of aggregation. Proust has supposed, that there are only two oxides of antimony, one at the *minimum*, containing 18.5 of oxygen in 100 parts, the other at the *maximum*, containing 23 of oxygen. This supposition rests principally, however, on the vague assumption, that metals are susceptible only of two degrees of oxidation. Thenard has, on the contrary, endeavoured to prove, that there are

at least six oxides of antimony capable of being distinguished by the proportions of oxygen which they contain; the one in the lowest degree of oxidation containing not more than 0.02 of oxygen, that in the highest degree containing 0.32; and the others containing intermediate proportions. It may be doubtful whether these degrees of oxidation can be established with perfect precision; but it is sufficiently probable, that antimony may combine with very different quantities of oxygen, and that even, like other metals, its degrees of oxidation are indeterminate, when they are not fixed by external circumstances connected with their formation. One other circumstance rendering the composition of the preparations of this class more complicated and variable, is that they are usually obtained by processes performed on the sulphuret of antimony, and hence they frequently retain a portion of sulphur in their composition.

The following oxides of antimony retain a place in one or other of the pharmacopœias.

Oxidum Antimonii Sulphurettum. Sulphuretted Oxide of Antimony.—Of this there are two varieties, differing in the proportion of their elements, and in the state of aggregation. The first is what used to be named Crocus of Antimony, (Crocus Antimonii,) what is now named by the Edinburgh College, Oxidum Antimonii per Nitratem Potassæ. It is prepared by deflagrating sulphuret of antimony with an equal part of nitrate of potash. The greater part of the sulphur is oxidated, and either dissipated in the state of sulphurous acid, or in the state of sulphuric acid remains combined with the potash of the nitre; a brown oxide of antimony remains, combined, according to Proust, with one fourth of sulphuret of antimony, but which it is more probable is directly combined with a portion of sulphur. It acts as a diaphoretic, emetic, or cathartic, but is so uncertain in its operation that it is never prescribed. It serves for the preparation of some other antimonials, and is

now employed by the Edinburgh College for the preparation of emetic tartar.

The second oxide of this family is what is named Oxidum Antimonii cum Sulphure Vitrificatum, formerly Vitrum Antimonii.—This is prepared by exposing sulphuret of antimony to the action of atmospheric air at a high temperature. The sulphur is dissipated, and the antimony oxidated, and by the intensity of the heat the oxide is vitrified. It still retains combined with it a portion of sulphur, or, according to Proust, one ninth of sulphuret of antimony. The oxide which forms its basis, contains, according to Thenard, sixteen of oxygen in one hundred parts. It has always combined with it too a portion of silex, derived from the crucible in which it is melted, this earth probably promoting its vitrification. Its operation is extremely harsh, and at the same time so uncertain, that it cannot be medicinally employed.

Oxidum Antimonii Vitrificatum cum Cera.—This is prepared by exposing the powder of the preceding preparation with an eighth part of wax to heat. It is thus rendered milder, probably by part of its oxygen being abstracted by the carbonaceous matter of the wax. It is a preparation, however, which has no advantage, and though once highly celebrated in dysentery, in a dose of from 5 to 15 grains, has long been in disuse, and might be expunged from the pharmacopœias in which it is still retained.

Oxidum Antimonii Album, formerly named Antimonium Calcinatum.—This is prepared by deflagrating sulphuret of antimony with a large quantity of nitrate of potash, (three times its weight,) so that the sulphur is entirely abstracted, and the metal is saturated with oxygen. This oxide retains also combined with it a portion of the potash of the nitre. The preparation is one comparatively inactive, and does not excite vomiting in a dose less than a scruple or half a drachm. In smaller doses, it has been used as a diaphoretic in the treatment of fever.

Oxidum Antimonii cum Phosphate Calcis, also named Pulvis Antimonialis.—This is prepared by exposing to heat sulphuret of antimony and bone-shavings, until they are converted into a gray coloured substance, which is exposed in a crucible to a more intense heat, until it become white. The animal matter of the bones is decomposed, the sulphur of the sulphuret is disipated, and the metal is oxidated, and this oxide remains mixed or combined (part of it being also in a vitrified state,) with the phosphate of lime of the bones. The preparation is similar in composition to the celebrated James' Powder, for which it is designed as a substitute. It acts as a diaphoretic, emetic, or cathartic, according to the dose in which it is administered, and is employed principally as a remedy in fever, to arrest the progress of the disease at its commencement, or afterwards to obtain a favourable crisis. It is given in a dose from 5 to 10 grains, repeated, if necessary, after an interval of five or six hours, until sweat, purging, or vomiting, is induced. Its peculiar advantages are, that with a considerable degree of activity, it is less harsh in its operation, and more uniform than some of the other antimonial oxides, while from its insolubility, it acts less rapidly on the stomach than emetic tartar does; it is therefore less liable to excite nausea or vomiting, and can be given so as to obtain with more certainty the general action of antimonials on the system. Its exhibition is best adapted to those forms of fever in which there is increased vascular action: in typhus, less advantage can be expected from it, and it is even hazardous from the excessive evacuation it is liable to induce.

Sulphurettum Antimonii Præcipitatum.—This name, obviously incorrect, is given by the London and Edinburgh Colleges to a preparation formerly named Sulphur Auratum Antimonii. The Dublin College have named it Sulphur Antimoniatum Fuscum. It is prepared by boiling sulphuret of antimony with a solution of potash, and adding to the filtered liquor, sulphuric acid, while

any precipitate is thrown down. This precipitate is of a reddish yellow colour; it is a combination of oxide of antimony with sulphuretted hydrogen and sulphur. In a dose from 5 to 10 grains, it produces the usual effects of antimonials, and has been employed as a remedy in fever; but from the uncertainty of its operation, it is discarded from practice.

The preparation named Kermes Mineral, and which is used on the continent, is the precipitate that subsides on cooling, from the liquor formed by the boiling a solution of potash on sulphuret of antimony; it differs from the former in containing less sulphur, and appears indeed to be merely a combination of oxide of antimony with sulphuretted hydrogen. It is given in a similar dose.

Antimonii Oxidum.—Under this name which is far from being distinctive, a preparation is inserted in the London pharmacopœia, formed by boiling sulphuret of antimony in muriatic acid, with the addition of a little nitric acid; straining the liquor, and adding to it a solution of sub-carbonate of potash. The precipitate is probably a sub-muriate. It is designed to be employed only in the preparation of other antimonials.

By combining the oxides of antimony with an acid, the sources of uncertainty in their operation are in a great measure removed, as their degree of oxidation is rendered determinate, and their activity is not influenced by the state of the stomach with regard to acidity. The greater number of these saline combinations, however, are too acrid to admit of internal administration, and there is one only, that in which the oxide of antimony is combined with tartaric acid, employed in practice. Of all the antimonials, this is most extensively used, and it is also the principal emetic derived from the mineral kingdom.

This preparation, the Emetic Tartar of the old nomenclature, the Tartrate of Antimony and Potash of

Modern Chemistry, (Tartras Antimonii et Potassæ,) improperly named in the pharmacopœias, Tartris Antimonii, and Antimonium Tartarizatum, is obtained by boiling super-tartrate of potash, with oxide of antimony; the brown oxide obtained by the deflagration of sulphuret of antimony with nitre, is ordered by the Edinburgh College; the white oxide, or rather sub-muriate, obtained from the decomposition of muriate of antimony, is employed by the London and Dublin Colleges: the excess of tartaric acid in the super-tartrate, is saturated by the antimonial oxide; and by evaporation and crystallization, a triple salt, tartrate of antimony and potash is procured. Its crystals are triedral pyramids, generally small; and it is readily soluble in water. It consists according to Thenard's analysis of it, of 38 of oxide of antimony, 16 of potash, 34 of tartaric acid, and 8 of water of crystallization.

Tartrate of antimony and potash is superior to all the antimonials, at least an an emetic; and with a degree of activity, which admits of its being administered with safety, its operation is sufficiently certain and uniform. As an emetic, it is established in common practice, it usually excites vomiting in the dose of a grain, or a grain and a half; but the proper mode of administering it is in divided doses, three or four grains being dissolved in four ounces of water, and an ounce of this solution being given every quarter of an hour, until it operate. It generally excites full vomiting, and is liable to be somewhat more active in its operation, than the milder emetics, such as ipecacuan, evacuating not only the contents of the stomach, but inverting even the motion of the duodenum, and either by this or by the compression exerted by the action of the muscles on the abdominal viscera causing bile to be discharged: it also frequently excites purging. In many cases, however, these are advantages, and in these, as well as in all morbid affections, where the stomach is not easily affected, it is the emetic properly employed; while, when the stomach

is irritable, where its contents are merely to be evacuated, or when the strength is exhausted, the milder emetics are to be preferred. In smaller doses, it has been employed as a nauseating remedy in fever,—a practice, however, now nearly relinquished. Assisted in its operation by tepid diluents, it may also be brought to operate as a diaphoretic, and to produce the effects of antimonials on the general system, though from its action being exerted at once on the stomach, owing to its solubility, it is more difficult to administer it with this intention without occasiong nausea or vomiting, than some of the less active antimonials, as the phosphate of antimony and lime.

Vinum Tartritis Antimonii.—This name is given to a solution of tartrate of antimony and potash in white wine, in the proportion of two grains to the ounce, and is intended as a substitute to what was formerly named Antimonial Wine,—a preparation obtained by digesting wine on oxide of antimony, and owing its power to the portion of oxide which the tartaric acid of the wine dissolved. A similar preparation is inserted in the London pharmacopœia, under the name of Liquor Antimonii Tartarizati, in which the tartrate of antimony and potash is dissolved in wine diluted with water. The propriety of either is doubtful. It has no advantage over a solution of extemporaneous preparation; and there is some reason to believe, that the tartrate in this state of solution is liable to spontaneous decomposition. In the preparation of the London College, this will probably happen still more readily from the dilution of the wine. It is principally as a diaphoretic that antimonial wine has been employed, in a dose of one drachm, its operation being often promoted by combination with tincture of opium.

Murias Antimonii.—Muriate of Antimony is the only other saline preparation of this metal inserted in the pharmacopœias; and it has a place as affording a product employed in the preparation of other antimonials.

Sometimes it has been applied externally as an escharotic.

ZINCUM. Zinc. (Page 177.)

SULPHATE of Zinc, it has already been remarked, is a powerful emetic, and as it operates speedily, and with much force, it is sometimes employed in cases where it is difficult to excite vomiting, but where it is of importance that the contents of the stomach should be immediately evacuated, where any narcotic poison has been swallowed. Its dose is from 5 to 20 grains, according to the state of the stomach, and it should be given in a state of solution.

CUPRUM. Copper. (Page 179.)

SULPHATE of Copper acts as an emetic, and its operation taking place almost as soon as it has reached the stomach, and without inducing much nausea, it has been recommended in some cases, where the object is merely to obtain the mechanical effects from the operation of vomiting, as in insipient phthisis, in which advantage has been supposed to be derived from the compression exerted on the thoracic viscera. Its operation is, however, liable to be very harsh, even in the small dose of 1 or 2 grains, in which it has been prescribed. In a larger dose, it has sometimes suceeded in producing vomiting, where the stomach, from the operation of a narcotic poison, had not been affected even by the sulphate of zinc. The acetate, or sub-acetate of copper has, like the sulphate, an emetic power, and has been employed in similar cases in a dose of one or two grains. It is liable to the same disadvantages.

AMMONIA.—Ammonia dissolved in water is applied to different medicinal purposes, and under some of the other classes it is to be more fully considered. When given in a pretty large dose, it is liable to excite vomiting, and it is sometimes employed to quicken the operation of other emetics where they have failed, a tea-

spoonful being given in a cupful of cold water, and a draught of tepid water being swallowed after it.

Hydro-sulphuretum Ammoniæ.—The Hydro-sulphuret of Ammonia, obtained by passing a current of sulphuretted hydrogen gas through a solution of ammonia in water, was introduced by Dr. Rollo, and has been received into the Edinburgh pharmacopœia. It acts with much energy on the stomach inducing nausea in a small dose, and in a larger dose occasioning vomiting. It is scarcely used as an emetic, but rather as a nauseating remedy; and the principal application of it has been in the treatment of diabetes, with the view of reducing the morbid appetite and increased action of the stomach. It is given in a dose of from 5 to 15 drops, twice a-day, and with advantage so far as related to the reduction of the increased action of the digestive organs.

EMETICS FROM THE VEGETABLE KINGDOM.

Ipecacuanha. Ipecacuan. Callicocca Ipecacuanha. Cephaëlis Ipecacuanha of Wildenow. *Pentand. Monogyn. Aggregatæ. Radix. South America.*

The natural history of this vegetable is still somewhat obscure, and the obscurity is increased by the roots of different plants being sometimes met with in the shops as ipecacuan. Hence the plant affording it has been successively referred to different genera. It is now, by the Edinburgh and London Colleges, referred to the genus Callicocca, and distinguished as a species by the name Ipecacuanha; but it appears still uncertain, whether the two more common varieties of ipecacuan are products of the same vegetable, the Peruvian and the Brazillian. The former has been even considered as a different species. The ipecacuan of the shops is usually in small wrinkled pieces, externally gray, internally whiter; has

a faint smell, and a bitter, slightly acrid taste. It contains both a resinous and gummy matter, or at least a matter principally soluble in alcohol, and another more soluble in water. It is generally stated, that its emetic power, and indeed its principal virtues, reside in the former. Dr. Irving has affirmed that they depend on the latter. Its active matter is completely extracted by proof spirit or wine. Vinegar likewise dissolves it, but at the same time greatly weakens its power. By decoction with water, its activity is greatly impaired, though the water distilled from it has scarcely any emetic effect. It is even injured by being kept long exposed in the state of powder to the air and light.

Ipecacuan is the mildest of those emetics which are at the same time sufficiently certain in their operation. It evacuates the contents of the stomach, without exciting violent vomiting, or extending its action beyond this organ; and is hence adapted to many cases where violent vomiting would be prejudicial. The medium dose of it as an emetic is 15 grains, though 20 or 30 may be taken with perfect safety, as it only operates more speedily, and a dose rather large is even preferable to a small dose, as more certain, and producing less nausea. The ipecacaun wine acts as an emetic in the dose of an ounce. Though principally employed as an emetic, ipecacuan is occasionally prescribed with other views. It was originally introduced as a remedy in dysentery, given either in such a dose as to produce full vomiting, or in the quantity of 2 or 3 grains repeated every three or four hours, till it occasioned vomiting, diaphoresis, or purging. It has been given in a similar mode in obstinate diarrhœa. In spasmodic asthma, it is exhibited in a full dose to relieve the paroxysm; and in a dose of 3 or 4 grains continued every morning for some weeks to prevent the disease. A singular idiosyncrasy has been observed in some individuals with regard to it, difficulty of breathing being induced by the effluvia arising from it in powder, especially when it is diffused in the air. In hæmorrhages it is given in nauseating

doses, the nausea diminishing the force of the circulation. Combined with opium it forms a very powerful sudorific.

Offic. Prep.—P. Ipecac. et Opii. Vin. Ipecac.—*Ed. Lond.*

SCILLA MARITIMA. Squill. *Hexand. Monog. Liliaceæ. Radix. South of Europe.*

SQUILL is the bulbous root of a plant growing on the sandy shores of Spain and Italy. It has little smell; its taste is bitter and acrid, and it is capable of inflaming the skin; its acrimony is lessened by drying; but its bitterness and active powers as a medicine are little impaired. In drying it loses about four-fifths of its weight. Its active matter is extracted by water, alcohol, and vinegar. The latter is the solvent commonly employed, as it best covers its nauseous taste, and it does not appear to injure its powers.

Squill, when given in a sufficient dose, excites vomiting, though it is seldom used with that intention in substance. The vinegar of squill acts as an emetic in a dose of 2 or 3 drachms, as does the syrup when given in double that quantity; and either of them is sometimes given in pertussis; the syrup, in particular, from its sweetness, being easily given to children. The dose is a drachm to a child below five years of age, and its activity is advantageously promoted by the addition of a little ipecacuan wine. This root is, however, much more used as a diuretic and expectorant; uses of it which are afterwards to be noticed.

Offic. Prep.—Acet. Scill. Mar. Pil. Scill. Syr. Scill. Mar. *Ed. Lond. Dub.*—Tinct. Scill. *Lond. Dub.*

ANTHEMIS NOBILIS. Chamomile.(See p. 200.)

ALL bitter drugs are liable to excite nausea or vomiting. Chamomile has perhaps more peculiarly this effect; a strong infusion of the dried flowers in tepid water excites vomiting, and a weaker infusion is often employed to quicken the action of other emetics, a draught of it being taken instead of tepid water.

SINAPIS ALBA. Mustard. *Tetradyn. Siliq. Siliquosæ. Semen. Indigenous.*

MUSTARD-SEED, when bruised, has a very considerable degree of pungency, and in powder, given in the dose of a large tea-spoonful, mixed with water, operates as an emetic. From its stimulant quality, it has been recommended in preference to other emetics in apoplexy and paralytic affections, and in such cases has sometimes been found to excite vomiting, when these had failed. It is convenient also as an auxiliary, when the dose of an emetic has not operated, a little of the powder of mustard being taken diffused in tepid water.

ASARUM EUROPÆUM. Asarabacca. *Dodecand. Monogyn. Sarmentaceæ. Folia. Indigenous.*

THE leaves and root of this vegetable, prior to the introduction of ipecacuan, were frequently employed on account of their emetic quality ; the dose of the dried leaves was 20 grains: of the dried root, 10 grains. As they were occasionally violent in their operation, and at the same time uncertain, they have fallen altogether into disuse. The plant is still retained in the Materia Medica as an errhine.

NICOTIANA TABACUM. Tobacco. (See p. 143.)

THE leaves of this plant, in a person unaccustomed to their use, by chewing or smoking, excite even in a small dose very severe and permanent nausea and vomiting; the same effects have followed even from their external application to the region of the stomach; and this method of exciting vomiting has been proposed to be employed in cases in which emetics cannot be easily administered by the mouth. Tobacco is sometimes taken under the form of infusion by the common people, but its operation is always harsh, and accompanied with severe sickness.

CHAPTER VIII.

OF CATHARTICS.

Cathartics are those medicines which quicken or increase the evacuation from the intestines; or which, when given in a certain dose, produce purging. They are medicines of considerable importance, and differ from each other very considerably in their powers.

Cathartics evidently act, by stimulating the intestines so as to increase the natural peristaltic motion. Their contents are thus more quickly propelled and evacuated. The greater number, or perhaps all of them, have however, a farther effect. They stimulate the extremities of the exhalant vessels, terminating on the inner surface of the intestines: they thus cause a large portion of fluid to be poured out, and hence the evacuations are more copious, and of a thinner consistence. Some cathartics have this power of increasing the effusion of fluids from the exhalants much more than others, such for instance are the Saline Purgatives. Dr. Cullen has even supposed that some may act solely in this way, and without increasing directly the peristaltic motion. There is, however, no proof of this; and it seems scarcely probable that any substance should act as a stimulant on these vessels, without at the same time stimulating the moving fibres of the intestines.

The action of cathartics is not confined to the parts to which they are directly applied. Their stimulus is extended to the neighbouring organs, and hence they promote the secretion, and increase the discharge of the bile and other fluids usually poured into the intestinal canal. These effects are produced in very different degrees, by different cathartics, and there seems some reason for admitting an opinion adopted by the ancients, that certain cathartics have peculiar powers, in this respect; some, for instance, having the power more partic-

ularly of promoting the discharge of bile, others that of the mucus of the intestines, or of the serum; and it is not improbable, adds Dr. Darwin, that the pancreas and spleen may be peculiarly stimulated into action, by some others of this class of medicines.

There is likewise a difference in cathartics with respect to the parts of the intestinal canal on which they act. Some increase its peristaltic motion through its whole length; others, as aloes, have their action more confined to the lower part, and principally to the rectum.

Lastly, it is to be observed, that the action of many cathartics is extended even to the stomach; its peristaltic motion is increased, either from association with the motion of the intestinal canal, or from the action of the stimulus of the cathartic applied, and its contents are therefore more quickly discharged by the pylorus. From this cause, a full dose of saline purgative will sometimes operate in half an hour after it is given.

There are several other differences between the medicines belonging to this class, some act slowly; others more quickly: some are liable to occasion nausea and griping, and in a large dose tenesmus; others, even when they operate effectually, are free from these disagreeable effects: some produce only one evacuation, others continue to act for a considerable time.

Besides the differences between particular cathartics, a general difference in their mode of operation has been supposed to exist, from which they have been classed under two divisions. Some operate mildly, without exciting any general affection of the system, without even stimulating perceptibly the vessels of the intestines, and hence they merely evacuate the contents of the canal. Others are more powerfully stimulant: they occasion an influx of fluids from the exhalant vessels, and from the neighbouring secreting organs: they even extend their stimulant effect to the system in general, and if taken in too large a dose are liable to excite much irritation, and even inflammation on the surface of the intestines. The former are distinguished by the

title of Laxatives, the latter are named Purgatives, and the stronger of them Drastic Purgatives. The distinction is not altogether correct, since it refers merely to a difference in power; yet neither is it one to be altogether neglected.

From the indications which cathartics are capable of fulfilling, their utility in many cases of morbid affection must be obvious. In some general affections of the system, they procure a prompt, copious, and therefore useful depletion. And wherever there exists retention of the contents of the intestinal canal, where these contents are acrid, or where extraneous bodies are present, their evacuation by the operation of a cathartic is the obvious method of treatment.

The valuable observations of Dr. Hamilton, have established, however, still more clearly the importance of this class of remedies, have shown that they admit of more extensive application, and have pointed out with more precision than has hitherto been done, the principles which regulate their administration.

In many diseases, their exists a state of the intestinal canal, giving rise to retention of its contents which is not to be obviated by the occasional administration of a cathartic, but which requires a continuation of the operation short of that of purging, until the healthy state of the bowels be restored. By this practice the cure of diseases has been accomplished, which, previously to Dr. Hamilton's publication, was treated by very different methods, and were not supposed to be so peculiarly connected with any state of the alvine evacuation.

Thus in fever, the peristaltic motion of the intestines is diminished, the fæculent matter is retained, and becomes a source of irritation; its evacuation, therefore, by the exhibition of purgatives is clearly indicated, nor has this been altogether neglected. Physicians, however, were scarcely aware of the necessity of producing it to a sufficient extent; and in fevers of the typhoid type in particular, were frequently deterred from doing so by the fear of reducing the strength of the system by

an evacuation considered as debilitating. Dr. Hamilton's observations establish the propriety of the freer use of purgatives in fever, so as to produce complete and regular evacuation of the bowels, through the whole progress of the disease ; and the cases he has published, afford striking proofs of the advantages derived from the practice. It is attended with equal advantage in scarlatina.

Several of the diseases comprehended under the class Neuroses appear to depend on, or to be very intimately connected with a torpid state of the intestines, from which an accumulation of their contents takes place, proving a source of irritation that often affects the general system. Chorea is proved by Dr. Hamilton's observations to arise from this cause ; and he has introduced with great success, the mode of treatment, by the free use of purgatives, continued until the healthy state of the alvine evacuation has been established. The same practice, and with similar success, applies to hysteria, and, in Dr. Hamilton's opinion, to that species of tetanus, which, prevailing in warm climates, and in warm seasons, appears to have its origin in disorder of the stomach and bowels. An ample evidence has established the success of the same treatment of the marasmus, which attacks the young of both sexes, which is marked by loss of appetite, weakness, wasting of the body, and at length total prostrastion of strength ; likewise in chlorosis, and in that hæmatemesis to which females are liable between eighteen and thirty years of age. In some of these diseases the quantity of matter accumulated in the intestines is extremely great ; the extent to which the exhibition of purgatives must be carried, and the length of time during which they must be continued, much exceed what would be calculated on from the usual administration of remedies of this class. The whole practice requires therefore, both decision and perseverance.

Analogies from some of these diseases lead to a similar exhibition of cathartics in other fevers, particularly in

the bilious remitting fever of warm climates, in measles, erysipelas, and small pox; likewise in scrofula, in dyspepsia, whether simple, or complicated with hysterical, or hypochondriacal mania; in cramp of the stomach, or of the extremities; in palpitation of the heart, and in those cases of hydrophobia which are not the effect of specific contagion. With regard to several of these, experience has established the soundness of the analogy.

In colic, and in ileus, the exhibition of cathartics is required, though there is considerable caution necessary in their application to avoid such irritation as would excite or increase inflammation. In dysentery, similar advantages are derived from them, and the same caution is requisite in their use.

Cathartics are farther employed with other intentions than merely to evacuate the intestinal canal. From the effusion of serous fluid which they occasion, by their stimulant action on the exhalant vessels, they are supposed to produce a diminution of fluids with regard to the whole body. This is in some measure an abstraction of the usual exciting powers acting on the system, and hence purging constitutes a part of what is named the Antiphlogistic Regimen, and is employed in inflammatory affections. By a similar operation, it increases absorption. There exists a certain relation between the exhaling and absorbing powers, so that when the action of the one is increased, that of the other is augmented; the increased exhalation of serous fluid, therefore, into the intestines, which cathartics occasion, causes an increased absorption; and thus the different species of dropsy are often cured by purging. It is evident that those cathartics which stimulate the exhalant vessels are best calculated to fulfil this indication; hence saline purgatives are in general most serviceable in dropsy.

Partly, it is supposed, from the serous evacuation which cathartics occasion, and partly on the derivation which they make from the head, and partly, no doubt, by removing a source of irritation, cathartics are of utility in preventing and removing apoplexy; in all

comatose affections, in mania, phrenitis, and the different species of headach.

Cathartics, especially the more powerful ones, require to be administered with caution even in diseases where they are indicated by peculiar circumstances, particularly any tendency to inflammation or to extreme debility; also during pregnancy, immediately after delivery, during the flow of the menses, and in those liable to hæmorrhoidal affections. The too frequent use of them induces wasting of the body, and sometimes renders the intestines morbidly irritable, so that purging is easily excited, while in other habits it renders them more torpid, and induces costiveness.

Some cautions are requisite with respect to the mode of administering cathartics. Many of them are apt to excite nausea or vomiting,—effects which are prevented by giving them at intervals in divided doses, or often by combining them with some aromatic. Such a combination also obviates the griping which they often occasion. The more active cathartics ought always to be given in divided doses; as in certain habits, even a small dose is liable to occasion unpleasant symptoms. In general also, these acrid cathartics ought to be given rather in combination, as the effect is obtained with more certainty. Colocynth, or scammony, or any other drastic purgative, may fail if given alone in such a dose as it is proper to venture on; but if smaller doses of two or three of them be mixed, their operation is more certain and easy. They irritate less when given in a liquid form: in that form too they act more speedily than when given in a solid state: hence, when we wish a cathartic to operate slowly, it is best given in the form of pill, and at bed time, as the state of diminished susceptibility in sleep retards the operation. In general, however, it is preferable to give the dose of a cathartic in the morning, as the operation of it is less troublesome to the patient. Dr. Hamilton has pointed out the common error in the exhibition of cathartics, that of their not being given to the requisite extent; and given the general rule

in all morbid affections, of repeating, and, if necessary, enlarging the dose while the evacuations remain offensive, or of an unnatural appearance, without however carrying their administration so far as to produce purging, unless this be the indication which is designed to be fulfilled.

Cathartics may be arranged in some measure according to their power, placing those first which operate mildly, and which have usually been denominated Laxatives, and proceeding to those which are more powerful, and have other effects than merely evacuating the contents of the canal. The Saline Cathartics may be placed under the latter division, though their operation, as has been already explained, is somewhat peculiar. To the class may also be added those substances which act as cathartics under the form of Enema.

CATHARTICS.

A.—LAXATIVES.

Manna.
Cassia fistula.
Tamarindus indica.
Ricinus communis.
Sulphur.
Magnesia.

B.—PURGATIVES.

Cassia senna.
Rheum palmatum.
Convolvulus jalapa.
Helleborus niger.
Bryonia alba.
Cucumis colocynthis.
Momordica elaterium.
Rhamnus catharticus.
Aloe perfoliata.
Convolvulus scammonia.
Stalagmitis cambogioides
Sub-murias hydrargyri.
Sulphas magnesiæ.
Sulphas sodæ.
Sulphas potassæ.
Super-tartras potassæ.
Tartras potassæ.
Tartras potassæ et sodæ.
Phosphas sodæ.

Murias sodæ.
Terebinthina veneta.
Nicotiana Tabacum.

LAXATIVES.

MANNA. Manna. Fraxinus Ornus. Fraxinus Rotundifolia. *Polygam. Diœc. Ascyroid. Succus concretus. South of Europe.*

THIS substance, though afforded by several vegetables, is usually obtained from different species of the ash-tree, particularly those mentioned above, which are cultivated in Sicily and Calabria. It is procured by spontaneous exudation, but more copiously by incisions made in the bark of the trunk. The juice, which exudes, soon becomes concrete. When it exudes slowly, the manna is more dry and white, and of a texture somewhat granulated, forming what is named Flake Manna. When the exudation is more copious, the juice is of a darker colour, and concretes into a soft unctuous-like mass, less pure than the other.

Manna has a sweet, though somewhat unpleasant taste, and possesses the general chemical properties of saccharine matter; it is entirely soluble in water and alcohol. The chemical difference between it and pure sugar is not very well established. When dissolved in alcohol, with the aid of heat, the solution on cooling deposites crystals apparently purely saccharine; and by concentration of the residual liquor, a mucilaginous extractive matter remains not crystallizable, having the peculiar taste of the manna. Although sugar in its unrefined state proves laxative, manna is so in a greater degree.

The dose of manna, as a laxative, is from one to two ounces to an adult, but it scarcely operates with sufficient effect to admit of being employed alone. Though mild in its operation, it is apt to produce flatulence and griping, and hence it is principally used in combination with other cathartics, particularly with senna, the bitter taste of which it covers. This combination is in common use as a purgative to children.

Offic. Prep.—Syrup. Mannæ. *Pharm. Dub.*

Cassia fistula. Purging Cassia, or Cassia in pods. *Decand. Monog. Lomentaceæ. Fructus; Pulpa Fructus. Egypt; East and West Indies.*

The fruit of this tree is in pods, nearly an inch in diameter, and ten or twelve in length. The external membranous part is firm and hard, the pulp within is of a black colour, and has a sweet taste, with a slight degree of acidity. It is extracted by boiling the bruised pods in water, and evaporating the decoction. It is soluble in water. According to Vauquelin's analysis of it, it contains, besides the fibrous part, gluten, jelly, mucilage, and saccharine matter.

This pulp proves gently laxative in a dose of four or six drachms; in the large dose necessary to occasion purging, it is apt to induce nausea or griping, and even as a laxative it has no particular advantage. The sole consumption of it is in the composition of the officinal preparation known by the name of Electuarium Sennæ. There is another electuary in the pharmacopœias, to which, as being the principal ingredient, it gives its name, and in which it is combined with manna and pulp of tamarinds, but this is never used.

Offic. Prep. —Elect. Cass. Fist. *Ed. Lond. Dub.*

Tamarindus indica. Tamarind. *Monadelph. Triand. Lomentaceæ. Fructus conditus. East and West Indies, America, Arabia.*

The pod of this tree includes several large hard seeds, with a brown viscid pulp, very acid. This pulp, mixed with the seeds and small fibres, and with a quantity of unrefined sugar added to preserve it, forms the Tamarinds of the shops. Vauquelin found it to contain, besides the sugar mixed with it, citric and malic acids, super-tartrate of potash, tartaric acid, jelly, mucilage, and fibrous matter.

The pulp of tamarinds, besides its virtues as an acid, proves laxative, when taken to the extent of an ounce, or an ounce and a half, but it is too weak to be employed alone. It is generally added to other cathartics, which are

given in the form of infusion, with the view of promoting their operation or of covering their taste. It is an ingredient in the Electuarium Sennæ, and there is an officinal infusion of it with senna, which affords a very pleasant purgative.

Offic. Prep.—Inf. Tam. Ind. cum Cass. Sen. *Ed.*

There are some other sweet fruits which have a laxative quality as the Fig (Ficus Carica,) and the Prune (Prunus Domestica.) These are sometimes used in domestic practice, and they are also ingredients in the Electuary of Senna.

Ricinus communis. Palma Christi. *Monæc. Monadelph. Tricoceæ. Oleum; Semen. West Indies.*

The seeds of the capsules of this plant are farinaceous, with a considerable quantity of unctuous matter intermixed. They afford, by expression or decoction, an oil which is used in medicine in this country under the name of Castor Oil. When obtained by decoction of the bruised seeds in water, it is purer and less acrimonious than when obtained by expression. It is of a yellowish colour, and has scarcely any peculiar taste or smell. It is the only example of an expressed oil having any medical activity.

As a laxative, castor oil acts mildly, and at the same time very effectually; it also operates in a shorter time than almost any other cathartic. Possessed of these advantages, it is a cathartic frequently employed; and is more peculiarly adapted for exhibition, where any degree of irritation is to be avoided. Its dose is one ounce. It is taken floating on pepper-mint water, mixed with any spiritous liquor, or any purgative tincture, as that of senna; or diffused in water by the medium of gum, sugar, or the yolk of an egg.

From the Mineral Kingdom, two laxatives, are derived, Sulphur and Magnesia.

Sulphur is an inflammable substance, found in nature, nearly pure, and likewise in combination with several of the metals. The greater part of the sulphur of commerce is the produce of volcanic countries. It is naturally mixed with earthy matter, from which it is freed by sublimation, forming the Sulphur Sublimatum, Flores Sulphuris, or Flowers of Sulphur. When melted and run into cylindrical molds, it forms Roll Sulphur, which is usually less pure.

Sulphur is of a light yellow colour; is insipid; has a faint smell, when rubbed or heated; is very fusible and volatile; and when heated in atmospheric air, burns with a blue flame, and the production of suffocating fumes. It is insoluble in water or alcohol, but is dissolved by oils, and combines with the alkalis, several of the earths, metals, and metallic oxides. It was, until lately, regarded as a simple substance; there is reason to believe, however, that it contains hydrogen, and that the pure inflammable base has not yet been obtained.

Sulphur in a dose of 2 or 3 drachms, acts as a laxative, and so mildly, that it is often used in hæmorrhoidal affections, and in other cases where, though the operation of a purgative is indicated, any irritation would be injurious. It likewise passes off by the skin, and is administered internally, and is applied externally in psora. In habitual dyspnœa and in chronic catarrh, advantage has been derived from it, probably partly from its action as a laxative, and partly as a diaphoretic. The solution of it in oil has been used in these cases, but this preparation is both acrid and extremely nauseous. Sulphur is always best given in the form of electuary. The purification of sulphur by washing is ordered in the pharmacopœias, but is a process altogether unnecessary. Precipitated by an acid from its solution by an alkali or lime, it is obtained of a whiter colour than in its usual state, and this precipitated sulphur is used in preference

to the sublimed sulphur in forming ointments. The combination of it with potash, Sulphurettum Potassæ, has also been introduced into the pharmacopœias, principally with a view of affording a substance which has been supposed capable, by its chemical action, of counteracting the operation of metallic preparations where these have been taken in excess.

Offic. Prep.—Sulphur Lotum. Ol. Sulph. Ung. Sulph. *Ph. Ed. Lond. Dub.*—Sulph. Præcipit. *Ph. Lond.*—Sulph. Potass. *Ed. Dub.*

Magnesia is a simple earth, not found pure in nature, but existing abundantly combined with certain acids, and from these saline combinations it is obtained by processes to be afterwards noticed. Either pure or in the state of carbonate, it is used as an antacid and laxative, in a dose of a drachm or more. Its laxative effect is generally considered as owing to its forming with the acid in the stomach a saline combination, which, like its other salts, is purgative, though, as it generally has this effect, it probably has itself a weak cathartic quality. From being insipid and mild, it is well adapted for exhibition to infants.

PURGATIVES.

Cassia Senna. Senna. *Decand. Monog. Lomontaceæ. Folia. Egypt. Arabia.*

The dried leaves of this plant are of a yellowish green colour; have a faint smell, and a bitter taste. Their active matter is extracted both by water and alcohol by infusion. By decoction with water, its activity is much impaired.

Senna is a purgative very frequently employed, having a considerable degree of activity, without being liable to be violent in its operation. It is usually given in the form of the watery infusion, 2 drachms being in-

fused in 4 or 6 ounces of tepid water, generally with the addition of a few coriander seeds, to cover its flavour, and obviate griping. It is also frequently combined with manna, with tamarinds, or with super-tartrate of potash; and as its taste can be covered by sugar or manna, it is a purgative very generally given to children. There is an officinal tincture of it which operates as a purgative in the dose of an ounce; there are also officinal infusions of it; and it enters into the composition of several other preparations employed as cathartics.

Offic. Prep.—Elect. Cass. Senn. Extr. Cass. Senn. Inf. Tam. Ind. cum Cass. Sen. T. Cass. Senn. C. *Ed.* —Inf. Senn. Pulv. Senn. C. *Lond.*—Syrup. Senn. *Lond. Dub.*

RHEUM PALMATUM. Rhubarb. *Enneand. Trygyn. Oleraceæ. Radix. Tartary.*

BESIDES the Rheum Palmatum, two other species, the Rheum Undulatum, and Rheum Compactum, are cultivated with the view of obtaining their roots, to be used in medicine; nor is any considerable difference, it is said, to be observed, between the root obtained from any of them when it is properly dried and preserved. The best Rhubarb is that named Russian or Turkey; it is in small pieces, with a large hole in the middle; of a lively yellow colour, with streaks of white; has a smell peculiar, and somewhat aromatic; and a bitter slightly styptic taste. Another kind is imported from the East Indies, or rather from China, in larger masses, more compact and hard, heavier, less friable than the other, and having less of an aromatic flavour. Rhubarb, cultivated in this country, has been prepared equal to either of the others, but in general it is inferior, probably from less care being bestowed on its cultivation and preparation.

The active principles of rhubarb are not very well ascertained. It is somewhat mucilaginous, and yields part of its powers to water by infusion. Alcohol likewise dissolves a considerable proportion of it; and diluted alcohol appears to be its most proper solvent,

dissolving all its active matter. It appears too to contain a portion of tannin, as it gives a deep colour with the salts of iron. It has the combination, rather singular, of an astringent with a cathartic power; and it does not appear from any analysis of it, whether these reside in different proximate principles or not. The watery infusion is said to be more purgative than the spiritous, and by applying heat to the rhubarb in substance, its purgative quality is lessened, while its astringency remains. The Chinese rhubarb is supposed to be more astringent than the Turkey. Every kind of it contains a quantity of earthy matter, chiefly lime, combined with sulphuric and citric acids, forming the principal part of the white streaks. This is generally more abundant in the Turkey rhubarb than in the others.

The dose of rhubarb as a cathartic is one scruple or half a drachm. Along with its purgative operation, it exerts a moderately astringent power, and has hence been considered as peculiarly adapted for exhibition in diarrhœa, any acrid matter being evacuated before it acts as an astringent. From the conjunction of bitterness with these qualities, it is likewise often used in dyspepsia and hypochondriasis, to obviate costiveness. And it enters into a number of officinal preparations, in which it is either the principal medicine, or combined with aloes, bitters, or aromatics.

Offic. Prep.—Inf. Rhei P. T. Rhei P. *Ed. Lond. Dub.*—Vin. Rhei. T. Rhei et Aloe. Tinct. Rhei et Gent. Pil. Rhei. C. *Ed.*—Tinct. Rhei, C. Extr. Rhei. *Lond.*

Convolvolus jalapa. Jalap. *Pentand. Monogyn. Campanaceæ. Radix. Mexico.*

The dried root of jalap is imported in thin tansverse slices; it is solid, hard, and heavy; of a dark gray colour, and striated texture. It has little smell; its taste is bitter and subacrid.

Jalap contains a resinous and a gummy matter, its purgative quality appearing to reside in the former, as it is extracted by alcohol, while its watery infusion is comparatively inert. Proof-spirit is its proper menstruum.

This root is an active purgative, producing full evacuation from the intestines; sometimes occasioning, however, nausea or griping. Its medium dose is half a drachm. Besides being given alone, it is very frequently used to quicken the action of other cathartics, of mild muriate of mercury for example; or it is combined with others, which are supposed to render it less stimulating, as with the super-tartrate of potash. It operates most mildly and effectually in substance, and is therefore seldom given under any form of preparation.

Offic. Prep.—T. Conv. Jal. *Ed. Lond. Dub.*—Extr. Conv. Jalap. *Ed. Dub.*—Pulv. Jalap. C. *Ed.*

HELLEBORUS NIGER. Melampodium. Black Hellebore. *Polyand. Polygyn. Multisiliquæ. Radix. Austria. Italy.*

THE root of this plant consists of short articulated fibres attached to one head, externally dark coloured, internally white. Its taste is very acrid, but the acrimony is much impaired by drying and by age. Its active power seems principally to reside in its resinous part. By decoction with water it yields half its weight of gummy matter, with some resin; and the extract obtained by inspissation of this, is milder than the root itself. Its distilled water, it is affirmed, is acrid, and even cathartic.

Black hellebore root is a very powerful cathartic, so violent, indeed, and at the same time uncertain in its operation, that it is scarcely ever used in substance: the watery extract of it, which is milder, has sometimes been employed. On its cathartic power probably depends any advantage that may be derived from its administration in mania and melancholia, in which diseases it was highly celebrated by the ancients. In dropsy it has been employed as a hydragogue cathartic, principally under the form of the spiritous extract. It was likewise strongly recommended by Mead as an emmenagogue, in the form of tincture, but with others has seldom been successful.

Offic. Prep.—T. Helleb. N. *Ed. Lond. Dub.*—Extr. Helleb. *Ed. Dub.*

Bryonia alba. Bryony. *Monæc. Syngenes. Cucurbitaceæ. Radix. Indigenous.*

The root of this plant, when recent, is highly acrid; by drying it becomes milder. In a dose of 20 grains of the dried root, it acts as a strong cathartic, and generally also as a diuretic. It is however, somewhat uncertain, and liable to be violent in its operation, and is therefore little used.

Cucumis colocynthis. Colocynth. *Monæc. Syngenes. Cucurbitaceæ. Fructus pulpa. Syria.*

The part of this plant used in medicine, is the dried spongy or medullary part of the fruit. It is white, soft, and porous, and has the seeds, which are comparatively inert, mixed with it. Its taste is intensely bitter. Boiled in water, it gives out a large portion of mucilage, less active than the colocynth itself. Alcohol also dissolves only part of its active matter.

Colocynth is one of the most drastic purgatives, so much so, that its operation is not easily regulated. Its dose is from 3 to 6 grains, but it is seldom that it is given by itself, being rather used to promote the operation of other cathartics. Combinations of it with jalap, aloes, or mild muriate of mercury, are thus given in obstinate constipation, in mania, and coma, and in these combinations it operates more mildly and more effectually than if given alone. Its infusion has been recommended as an anthelmintic.

Offic. Prep.—Pil. Aloes cum Colocynth. *Ed.*—Extr. Colocynth. *Lond.*—Extr. Colocynth. Comp. *Lond. Dub.*

Momordica elaterium. Wild Cucumber. *Monæc. Syngenes. Cucurbitaceæ. Fecula Fructus. South of Europe.*

The expressed juice of the fruit of this plant deposites a fecula, which when dried, has been known by the name of Elaterium. It is a very powerful cathartic, and from the violence of its operation has been ventured to be exhibited only in the most obstinate cases. Its dose is half a grain, repeated every hour, or every sec-

ond hour, till it operate. As a hydragogue cathartic, it has sometimes been given in dropsy.

RHAMNUS CATHARTICUS. Buckthorn. *Pentand. Monogyn. Dumosæ. Baccarum succus. Indigenous.*

THE berries of this vegetable are very succulent, and the juice they afford by expression has a cathartic power. Made into a syrup by boiling with sugar, it operates in a dose of an ounce. It is disagreeable, however, in its operation, being liable to occasion thirst and griping, and is seldom used.

Offic. Prep.—Syr. Rhamn. C. *Ed. Lond.*

ALOE. Aloe Socotorina. Aloe Barbadensis. Aloes Socotorine, and Barbadoes. Aloe Perfoliata, et Spicata. *Hexand. Monogyn. Liliaceæ. Succus spissatus. Africa. Asia, America.*

ALOES is a concrete resinous juice. Several varieties of it are met with in the shops, which differ in their purity, and likewise in their sensible qualities. The Socotorine, brought from the African island of Socotora, is considered as the purest. It is in small pieces of a reddish brown colour. The Barbadoes aloes is in large masses, of a lighter colour, and having an odour much stronger, and more unpleasant than the former. It is also named Hepatic aloes. The Cabbaline is still more impure, more fœtid, and is weaker in its power. There is still some uncertainty with regard to the species producing these varieties. The Aloe Perfoliata is that referred to by the Edinburgh College, as affording the varieties both of hepatic and socotorine aloes. The Dublin College refer to the Aloe Spicata, and it is said to be this species which is a native of the Cape of Good Hope, whence much of the aloes of the shops is imported. The London College give the same species as that which affords the Socotorine Aloes; while the Barbadoes Aloes, on the authority of Sibthorp, they consider as the produce of a species named Aloe Vulgaris. The Socotorine aloes is the inspissated expressed juice of the leaves of the plant. The Barbadoes aloes is pre-

pared by cutting the plant and boiling it in water. The liquor is evaporated to the consistence of honey, and is run into large gourd shells, in which it becomes concrete.

The taste of all the kind of aloes is intensely bitter; their odour disagreeable. They consist of extract and resinous matter, the former being in large quantity; the latter, obtained by the action of alcohol, has little smell or taste. Diluted alcohol dissolves all the active matter of this concrete juice.

Aloes as a cathartic, has some peculiarities. It is more slow in its operation than any other purgative; it merely evacuates the contents of the intestines and no greater effect is obtained from a large dose than from one comparatively moderate. These have been regarded as proofs, and perhaps justly, that its operation is principally on the larger intestines. Its medium dose is 10 grains. As a purgative, it is often employed to obviate habitual costiveness, and it is often combined with other cathartics to produce more complete evacuation. From the supposition of its stimulant operation being more particularly exerted on the rectum, it has been supposed to have a tendency to occasion hæmorrhoids, —an opinion for which there does not appear much foundation. On the supposition too of its stimulating effect being extended to the uterus, it has been regarded as a purgative to be avoided during pregnancy, and on the same hypothesis it has been supposed to exert an emmenagogue power.

Offic. Prep.—Pil. Aloes. Pil. Al. cum Assafœt. Pil. Aloes cum Colocynth. P. Aloes cum Myrrh. T. Aloes Æth. T. Aloes cum Myrrh. Vin. Aloes Socc. *Ed.*—Pil. Aloes cum Zingib. Pulv. Al. cum Canella. Pulv. Al. cum Guaiac. *Ph. Dub.*—Pulv. Aloes Comp. T. Aloes C. Decoct. Aloes. Extract Aloes. *Lond.*

CONVOLVOLUS SCAMMONIA. Scammony. *Pentand. Monogyn. Campanaceæ. Gummi-resina. Syria.*

SCAMMONY is obtained by cutting the root of the plant, and inpissating the juice which exudes, by exposure to the sun and air. It is in small fragments, of a blackish gray colour, having little smell, and a bitter sub-acrid taste. It is however, variable in its qualities and is often adulterated by the intermixture of earthy matter. It is one of what are named Gum-resins, and consists of resin and gum, in general, nearly in equal proportions.

Scammony is one of the most drastic purgatives, and is employed chiefly where the less powerful substances of this classs would fail. Its dose is from 5 to 10 grains, but it is generally combined in a smaller dose with other cathartics. It is also used as a hydragogue purgative in dropsy, combined usually with super-tartrate of potash.

Offic. Prep.—Pulv. Scamm. C. *Ed.*—Pulv. Scamm. C. Confect. Scamm. *Lond.*

GAMBOGIA. Gamboge. Stalagmitis Cambogioides. *Polyand. Monoec. Tricoccæ. Gummi-resina. India.*

THIS gum-resin is obtained by exudation, from incisions made in the branches and trunk of the tree. It is brittle, of a lively yellow colour, and resinous fracture, has a taste bitter and acrid. Water and alcohol partially dissolve it, and its solution in alcohol becomes turbid on the addition of water.

Gamboge is a very powerful cathartic, liable in large doses to excite vomiting, or to act with violence, and occasion profuse evacuations, with griping and tenesmus. Its medium dose is from 2 to 6 grains. It is seldom employed but in combination with some of the other powerful cathartics, in obstinate constipation. It is also used to expel the tape-worm, and as a powerful hydragogue cathartic in dropsy. In the latter application of it, it is frequently combined with super-tartrate of potash.

Offic. Prep.—Pil. Gambog. Comp. *Ph. Lond.*

MURIAS HYDRARGYRI. MITIS. CALOMELAS. Mild Muriate of Mercury. Calomel. Sub-muriate of Mercury of the London and Edinburgh Pharmacopœias.

THOUGH several of the preparations of mercury have a degree of cathartic power, this is most evident in the mild muriate; and this preparation is even in common use as a cathartic. It operates as such, when given alone in a dose of from 5 to 10 grains, but with more certainty and power when its operation is promoted by the addition of a little jalap or rhubarb. One valuable quality which it has, is that of promoting the operation of other cathartics, without exciting any additional irritation, or rendering them liable to act with violence; it is therefore, in more obstinate cases, combined with colocynth, scammony, or gamboge; and such a combination affords the safest of the powerful cathartics.

A DIVISION of Cathartics remains, intermediate in their operation between the Laxatives and Purgatives, more powerful than the one, less acrid and stimulating than the other. These are the Neutral Salts. They appear to act principally by stimulating the exhalant vessels on the inner surface of the intestines, so as to cause a larger portion of serous fluid to be poured out, which at once dilutes the contents of the canal, and by its operation, aided by the stimulus of the saline matter, accelerates the peristaltic motion. By the watery evacuation which they thus occasion from the general system, they are particularly adapted to those cases where inflammatory action or tendency to it exists.

SULPHUS MAGNESIÆ. Sulphate of Magnesia.

THIS salt, formerly known by the name of Bitter Purging Salt, and Epsom Salt, is found in mineral waters, whence it has been extracted, but at present is

principally obtained from the liquor remaining after the crystallization of muriate of soda from sea-water, which holds a quantity of it, and of muriate of magnesia dissolved. This is boiled down, and when exposed to sufficient cold affords a mass of slender needle-like crystals. These are deliquescent from the presence of a little muriate of magnesia; the sulphate when pure forms large regular crystals, which are rather efflorescent. They are soluble in nearly an equal weight of water. Their taste is extremely bitter.

This salt is used as a purgative, in a dose of from one to two ounces, dissolved in water. Though its taste be bitter, it has been remarked that it remains better on the stomach than many other cathartics, especially when given in small repeated doses, and in a solution largely diluted. Exhibited in this manner, it has been particuly recommended in ileus and colica pictonum.

Sulphas Sodæ, Sulphate of Soda, long known by the name of Glauber's Salt, is prepared by various processes on a large scale; but in that given in the pharmacopœias, it is obtained from the residuum of the decomposition of muriate of soda, by sulphuric acid, in the preparation of muriatic acid. The saline mass is dissolved in water; any excess of acid is neutralized by the addition of lime, and the pure sulphate of soda is obtained by evaporation. Its crystals are six-sided prisms; they are efflorescent, soluble in three parts of cold, and in an equal part of boiling water. The taste of this salt is very bitter and nauseous. It is one of the saline purgatives in most common use. Its medium dose is an ounce and a half, dissolved in six or eight ounces of water.

Sulphas potassæ. Sulphate of Potash, formerly named Vitriolated Tartar, is prepared by the direct combination of its principles, or by neutralizing the excess of acid in the residuum of the distillation of nitric acid from sulphuric acid and nitre. It forms in small irregular crystals, which require 17 parts of cold water

for their solution. In a dose of 4 or 6 drachms, this salt acts as a purgative, but its comparatively sparing solubility prevents it from being much employed; in one of 2 or 3 drachms, it is given as an aperient, frequently in combination with rhubarb or other vegetable cathartics.

SUPER-TARTRAS POTASSÆ. Super-Tartrate of Potash, formerly Crystals or Cream of Tartar, (Crystalli vel Cremor Tartari.)

THIS salt is gradually deposited from wine, in the progress of the slow fermentation which it suffers when kept, and is purified by repeated solutions and crystallizations. It consists of potash, with an excess of tartaric acid. Its taste is sour. It is in irregular crystals, which are sparingly soluble in water, requiring about 60 parts of cold, or 30 of boiling water. This salt operates as a purgative in a dose of 4 or 6 drachms, and being free from any unpleasant taste, it is not unfrequently used, given generally under the form of electuary; the only inconvenience attending its operation, is its being liable to occasion flatulence, and if habitually used, it is liable from its acidity to injure the tone of the stomach. It appears, at the same time, to increase the action of the absorbent system; hence as a hydragogue and diuretic it is employed in dropsy, and is also the cathartic most effectual in removing obesity.

TARTRAS POTASSÆ. Tartrate of Potash. Tartarum Solubile. Soluble Tartar.

THIS salt, the neutral tartrate of potash, formerly named Soluble Tartar from its greater solubility, is prepared by saturating the excess of acid in the supertartrate by the addition of potash. From its affinity to water, it is not easily crystallized with regularity; when obtained by evaporation, it is even somewhat deliquescent: its taste is bitter. It is a mild purgative, and at the same time operates effectually, given in a dose of six drachms or an ounce.

TARTRAS SODÆ ET POTASSÆ. Tartrate of Soda and Potash.

THIS salt, formerly known by the name of Rochelle Salt, is a triple one, being prepared by saturating the excess of acid in the super-tartrate of potash by soda. It crystallizes in large and regular transparent rhomboidal prisms, which are permanent in the air, and soluble in about six parts of cold water. Its taste is less unpleasant than that of the greater number of the saline purgatives, and it operates in a similar manner. Its medium dose is an ounce, given usually dissolved in tepid water.

PHOSPHAS SODÆ. Phosphate of Soda.

To prepare this salt, bones are calcined to whiteness, so as to obtain the phosphate of lime which is their base. This is submitted to the action of sulphuric acid, which combines with part of the lime, and leaves a super-phosphate of lime, which is dissolved by water. To this solution, a solution of carbonate of soda is added, till there be a slight excess of alkali; the soda combines with the excess of phosphoric acid, and by evaporation the phosphate of soda is crystallized. Its crystals are rhomboidal prisms. Its taste is the least nauseous of all the saline purgatives, and its operation is equally mild and effectual. Hence it has been established in practice, and is useful as a cathartic where there is any tendency to nausea. One ounce of it is given, dissolved generally in tepid water, as soup made without salt.

BESIDES the preceding Cathartics, there are some which are employed only under the form of Enema.

MURIAS SODÆ. Muriate of Soda. Common Sea Salt.

THIS salt probably has some cathartic power, but its strongly saline taste prevents it from being employed. It forms the active ingredient, however, of the common

domestic enema; from half an ounce to an ounce of it being dissolved in a pound of tepid water, and a small quantity of expressed oil added.

TEREBINTHINA VENETA. Venice Turpentine. *Pinus Larix. Monæc. Monadelph. Coniferæ.*

THE resinous juice of this tree, the Larch, exudes from incisions made in its trunk. It is of the consistence of honey, has the peculiar smell of the turpentines, and a bitter acid taste. It consists of resin and essential oil; sometimes it is employed as a cathartic under the form of enema, half an ounce of it being triturated with the yolk of an egg, and suspended in a sufficient quantity of water. As it has a considerable share of acrimony, it is employed only where those of milder operation fail.

NICOTIANA TABACUM. Tobacco. (p. 143.)

THE smoke of tobacco, introduced into the intestines, has sometimes succeeded in producing evacuation in colic and ileus, after other purgatives have failed, not improbably from its narcotic operation inducing relaxation of the muscular fibre. An infusion of 1 or 2 drachms of it in a pint of warm water is more convenient; but much caution is requisite in the use of either, as tobacco, from its narcotic power, is apt to induce extreme sickness and debility. It is only where other methods have been unsuccessful, that its administration can be proper.

CHAPTER IX.

OF EMMENAGOGUES.

The medicines distinguished by the appellation of emmenagogues, are those which are capable of promoting the menstrual discharge.

The suppression of this discharge is supposed to arise from debility of the uterine vessels, or deficiency of action in them. Hence, it might be inferred, that the medicines capable of exciting it must be such as can stimulate these vessels.

General stimulants, or tonics, may to a certain degree have this effect, since, in consequence of their action, the uterine vessels must be stimulated in common with other parts. There are accordingly several stimulants, both diffusable and permanent, employed as emmenagogues.

It is doubtful whether there is farther any particular determination to these vessels. It is sufficiently certain that there are many substances, which, when received into the stomach, have their stimulant operation more particularly determined to one part than to another; to the kidneys for example, the bladder or other organs. It seems possible, *a priori*, that there may be substances disposed to act more peculiarly on the uterus; yet experience does not confirm this supposition; there being perhaps no proof of any of the substances styled Emmenagogues, producing their effect from any specific power.

A stimulant effect, however produced in neighbouring parts, seems to be in some degree propagated to the uterine vessels; and hence several medicines exert an emmenagogue power, greater than can be ascribed to any general action they exert on the system. It is thus that some substances, belonging to the class of cathartics, have been supposed to act, their stimulus being

communicated from the larger intestines to the uterus. They are probably of advantage too in amenorrhœa, simply as cathartics, removing that state of torpor in the intestinal canal connected with the disease.

There is also one stimulus, that of electricity, which can be brought to act directly on the uterine system, and it has been sometimes found to operate as a powerful emmenagogue.

The individuals belonging to this class may be arranged in some measure according to these distinctions; the most active of them being substances belonging to other classes; and there being a few only supposed to be possessed of any specific emmenagogue power. With regard to all of them, it may be added, that there are no medicines so uncertain in their operation, and none in which the conclusions respecting their efficacy are more liable to fallacy.

EMMENAGOGUES.

FROM THE CLASS OF ANTISPASMODICS.

Castoreum.
Ferula assafoetida.
Bubon galbanum.

FROM THE CLASS OF TONICS.

Ferrum.
Hydrargyrum.

FROM THE CLASS OF CATHARTICS.

Aloe.
Helleborus niger.

Sinapis alba.
Rubia tinctorum.
Ruta graveolens.
Juniperus sabina.

Castoreum. Castor. (Page 153.)

Under the history of Castor already given, it was remarked, that it appears to be a substance wholly inert. As an emmenagogue, it has been given in the dose of ten grains in substance, or more frequently under the form of tincture in the dose of one drachm. No reliance is now placed on its powers.

Assafoetida. Assafœtida. (Page 156.)

All the fœtid gums have been supposed to possess, along with their antispasmodic property, the power of acting more peculiarly on the uterine system, and have

been therefore employed as emmenagogues. Assafœtida, the strongest of them, has been given in amenorrhœa, in a dose of 10 or 15 grains, or in the form of tincture; but probably with little advantage. Galbanum, another of these fœtid gums, next in strength to assafœtida, has been given in a similar dose.

Ferrum. Iron. (Page 174.)

The powers of iron as a tonic may be supposed capable of being exerted on the uterine system, and of removing suppression of the discharge arising from deficient action of the uterine vessels, more especially when this is connected with a state of general languor and debility. In such cases, accordingly, it is frequently employed as an emmenagogue. The carbonate of iron is given in a dose of five or ten grains daily, continued for some time; the more active preparations of the sulphate and muriate are likewise prescribed, but in general there is some difficulty in continuing their administration, unless in small doses, from the irritation they are liable to occasion. The chalybeate mineral waters afford perhaps the best form of administering iron in amenorrhœa.

Hydrargyrum. Quicksilver. (Page 164.)

The general stimulant operation of this metal may, like that of iron, be supposed to be so far exerted on the uterine system, as to obviate any state of diminished action; some of its preparations are accordingly occasionally employed in amenorrhœa. The mild muriate or calomel is the preparation generally used. It is given in the dose of a grain; more frequently, however, in combination with other emmenagogues, to promote their action, than alone.

Aloe. Aloes. (Page 274.)

This cathartic, it has already been remarked, is supposed to operate more peculiarly on the larger intestines; and its stimulant operation, it has been imagined,

is thence propagated to the uterus. Hence its celebrity as an emmenagogue, though what efficacy it has probably depends principally, if not entirely, on its mere cathartic power. It is given under the form of pill or tincture; and frequently in combination with other remedies, particularly with myrrh, rhubarb, and the preparations of iron.

HELLEBORUS NIGER. Black Hellebore. (Page 272)

BLACK Hellebore is a powerful cathartic; it was also highly recommended by Mead as an emmenagogue under the form of tincture, one drachm of this being given as a dose at bed time, and continued for some time. Its emmenagogue might be supposed to depend on its cathartic power; in this dose, however, and under this form, it has little sensible effect; and any advantage derived from it is extremely doubtful. The extract has been employed as a more active preparation in combination with aloes, or with carbonate of iron.

SINAPIS ALBA. Mustard. (Page 256) *Semen.*

THE seeds of this plant have a considerable degree of pungency, and when taken unbruised to the extent of half an ounce or an ounce, have a purgative effect. This is a popular remedy, not unfrequently used in amenorrhœa and chlorosis.

RUBIA TINCTORUM. Madder. *Tetrand. Monogyn. Stellatæ. Radix. South of Europe.*

THE root of this plant is in slender twigs, of a red colour; it has a bitter taste, with little smell. It has been recommended as an emmenagogue, in a dose of half a drachm thrice a-day. It appears to be nearly inert, and its inefficacy is generally ackowledged.

RUTA GRAVEOLENS. Ruta. Rue. *Decand. Monogyn. Multisiliquæ. Herba. South of Europe.*

THIS herb, when recent, has a strong unpleasant smell, and a bitter taste. By distillation it affords a

pungent essential oil. It has been prescribed as an emmenagogue under the form of the watery infusion; and the oil is sometimes combined with aloes, and other medicines of the same class, probably with little advantage.

Offic. Prep.—Extr. Rutæ Gr. *Ed. Dub.*—Ol. Rutæ. *Dub.*—Confect. Rutæ. *Lond.*

JUNIPERUS SABINA. Savin. *Dioecia. Monadelph. Coniferæ. Folia. South of Europe.*

THE leaves of this plant have a bitter penetrating taste, a strong unpleasant odour, and a considerable degree of acrimony. They afford a very large quantity of essential oil, possessing the general virtues of the plant.

Savin is a stimulant, the operation of which has been supposed to be powerfully directed to the uterine system; so much so, that according to the common opinion, it is capable of procuring abortion. It has in conformity to this been considered as an emmenagogue, but is scarcely ever administered internally. Externally, the powder of the dried leaves is used as an escharotic, and mixed with lard as a stimulant to excite suppuration from inflamed surfaces.

Offic. Prep. —Extr. Sabinæ, *Ph. Dub.*—Cerat. Sabin. *Dub. Lond.*—Ol. Sabinæ, *Ed. Dub.*

CHAPTER X.

OF DIURETICS.

Diuretics are those medicines which increase the urinary discharge ;—an effect which is probably produced by different modes of operation.

It is obvious, that any substance capable of stimulating the secreting vessels of the kidneys, by direct application to them, may increase their action, and thus produce a more copious discharge of urine. It is probably in this way, that many of the saline diuretics act: the principal office of these organs seem to be to separate from the blood, the saline matter it contains, and which would otherwise accumulate in the system ; when substances of this kind, therefore, do not operate as cathartics, but are received into the circulating mass, they are brought to the kidneys in the course of the circulation, are secreted by their vessels, and exciting in them increased action, a larger portion of watery fluid is also secreted. Several of these substances, as nitre, or the fixed alkalis, can be detected in the urine by chemical tests after they have been administered, and therefore, there can be little doubt of this being the mode in which they operate. There is evidence even of some vegetable diuretics passing off by the same emunctories. The flavour of asparagus, or of garlic, or turpentine, for example, may be observed in the urine discharged an hour or two after they have been received into the stomach.

It is also probable, however, that a diuretic effect is in other cases produced by substances acting only on the stomach, the action they excite being communicated by sympathy to the kidneys. Squill and tobacco appear to act in this manner, as there is no proof that they are received into the circulating mass ; they act

very peculiarly on the stomach, and when they occasion vomiting or purging, they generally fail in their diuretic effect. It may be concluded, therefore, that they exert a peculiar action on the stomach, which, propagated to the kidneys, by means of the general connection subsisting between all the parts of the system, causes an increase in the urinary discharge. The different kinds of ardent spirits diluted with water, seem to act in a similar manner, as their diuretic effect usually takes place very speedily.

There is still a third mode, in which it seems probable that some substances produce a diuretic effect, especially in a state of disease. It is known that persons who drink sparingly, discharge less urine than others; or that where the watery part of the blood is carried off by perspiration, the urinary discharge is diminished. It is farther known, that large draughts of water, or of any mild diluent, if not determined to the skin by external warmth, occasion an increased discharge of urine. It seems probable, therefore, that a similar effect may be produced, by the action of substances which powerfully stimulate the absorbent system, and thus bring an increased quantity of serous fluid into the course of the circulation. Digitalis is probably a remedy of this kind. Its effect as a diuretic is more certain and powerful, when given to a person labouring under dropsy, than to one in health; it appears too to be one of those medicines which stimulate most powerfully the absorbent system; its diuretic power in dropsy, therefore, is probably principally owing to its enabling the absorbents to take up the serous fluid effused; this is of course brought into the circulation, and like any other watery fluid is discharged by the kidneys.

On the same principle is explained the utility of a practice, which has been employed to promote the action of diuretics, that of conjoining mercury with them.

Thus, the action of squill as a diuretic, is rendered more certain and powerful by combination with calomel; each of them being given in separate doses, or

both being united in one formula. The efficacy of this is probably derived from the mercury stimulating the absorbents, and, by introducing the effused fluid into the system, promoting the direct diuretic action of the squill.

The action of diuretics is promoted, by drinking moderately of watery liquors; hence the practice that was formerly adopted in dropsy, of diminishing the allowance of drink, is exploded; it was of little benefit in preventing the accumulation of effused fluid, and the abstinence from liquids that was enjoined, rather prevented the action of the diuretic remedies that were employed for the cure of the disease. Many cases even have occurred in which pure water, mineral waters, or mild diluents, have acted as diuretics, and effected a cure in dropsy.

The action of diuretics is also considerably dependant on the state of the vessels of the skin. If, when a medicine of this class has been given, these vessels are stimulated by external warmth, its action is rather determined to the surface, and sweat or diaphoresis takes place. But if the surface is kept cool, the diuretic effect is more certain; so much indeed does this state of the surface determine to the kidneys, that the usual diaphoretics may be brought to act as diuretics.

The general effects of diuretics are sufficiently evident. They discharge the watery part of the blood, and by that discharge they indirectly promote absorption. Dropsy is the disease in which they are principally employed, and they are adapted to every form of it. The disease can also be removed with less injury to the patient, by exciting the urinary discharge, than by any other method. The success of diureties in dropsy is however very precarious; sometimes none of them succeed; sometimes one acts more powerfully than another, though in this there is no uniformity; nor are the causes of this variety of operation well understood. In general, it is obvious, that where a strong predisposition to the disease exists, or where it originates from organic affec-

tions of the liver, or other chylopoëtic viscera, no great advantage can be expected from the mere evacuation of the water by the action of diuretics: it is only in those cases where an accumulation of fluid has taken place from diminished absorption, or some similar cause, that they can be expected to effect a cure. It accordingly often happens in practice, that an increased discharge of urine is effected by the exhibition of diuretics, and still the dropsical swellings are not removed, or, if they are, they speedily return.

Diuretics have been likewise used in calculous affections, with the view of preventing at least the increase of the calculus, by rendering the urine more watery; and they have occasionally, though rarely, been employed to lessen plethora, or check profuse perspiration. The use of diluents, so as to increase the quantity of urine, is of use in gonorrhœa, and other affections of the urinary passages, by lessening the acrimony of the urine, which excites pain from its action on these parts, when they are in an inflamed state.

The cautions with regard to the administration of diuretics, are obvious from what has been said of their operation. The surface of the body must be kept cool, and therefore the doses of the medicine ought to be given in the course of the day, and the patient should if possible be kept out of bed. The use of diluents ought to be permitted, at least this is more necessary with respect to those diuretics belonging to the class of salts, and which operate directly on the secreting vessels of the kidneys.

The individual diuretics may be considered under the subdivisions of Salts, Vegetable Diuretics, and one or two derived from the animal kingdom.

DIURETICS.

SALINE DIURETICS.

Potassa.
Acetas potassæ.
Super-tartras potassæ.
Nitras potassæ.
Spiritus etheris nitrosi.

FROM THE VEGETABLE KINGDOM.

Scilla maritima.
Digitalis purpurea.
Nicotiana tabacum.
Solanum dulcamara.
Lactuca virosa.
Colchicum autumnale.
Gratiola officinalis.
Spartium scoparium.
Juniperus communis.
Copaifera officinalis.
Pinus balsamea.
Pinus larix.

FROM THE ANIMAL KINGDOM.

Meloe vesicatorius.

SALINE DIURETICS.

Potassa. Potash, either pure, or in the state of sub-carbonate, is a diuretic; and, as has been already remarked, is secreted by the kidneys, so that when continued for a sufficient time, it renders the urine alkaline. The saline matter from the ashes of broom, wormwood and other plants, which is sub-carbonate of potash, more or less pure, used formerly to be frequently prescribed in dropsy. It is difficult to continue the administration of the alkali, however, to the requisite extent, without occasioning irritation; and being inferior in diuretic power to the super-tartrate of potash, it has fallen into disuse. When employed, the dose of the sub-carbonate is 20 or 30 grains dissolved in a large quan-

tity of water, and repeated three or four times in the course of the day.

ACETAS POTASSÆ. Acetate of Potash. Sal Diureticus.

THIS salt, prepared by saturating potash with acetic acid, and evaporating the solution to dryness, is obtained in the state of a white foliated mass, deliquescent and very soluble in water. It has been considered as a powerful diuretic, and has been used in dropsy, half a drachm of it dissolved in water being given every hour or two until it operate. It is uncertain in its operation, however, and has therefore fallen into disuse.

SUPER-TARTRAS POTASSÆ. Super-tartrate of Potash. Cream of Tartar. (Page 279.)

THIS salt, of which the chemical history has been already given, and its applications as a cathartic noticed, is extensively employed as a remedy in dropsy, and is inferior to few of the substances belonging to this class. There are two modes under which it is exhibited, either so as to obtain principally its diuretic effect, or along with this its action as a hydragogue cathartic. When given with the first intention, the form of exhibition is solution in water, from half an ounce to an ounce being dissolved in the due proportion of water, and this being taken in the course of the day, its operation on the kidneys being promoted by dilution. The more usual practice, however, is to give it in substance, either diffused in a little water, or made into an electuary with syrup, and in such doses as to occasion purging to a certain extent. The dose is various, its operation being apparently much dependant on the action of the absorbents being excited, and this in different states of disease, being effected with more or less difficulty. Half an ounce is given at first, and this is increased to an ounce, or even two ounces in twenty-four hours, the increase of dose being continued until its effects on the kidneys or bowels is obtained, and care being taken not to push it so far as to produce greater evacuation than the strength of the patient can support. It generally causes a con-

siderable discharge of serous fluid into the intestinal canal, so as to produce watery evacuations, and at the same time augments the quantity of urine; the size of the dropsical swelling soon begins to be reduced; and the effused water, according to those practitioners who have represented its efficacy in the most favourable light, is not only removed, but any renewal of the effusion is prevented with more certainty than by the action of other diuretics: hence it has been regarded as in general superior to the other medicines of this class in the treatment of dropsy.

There can be no doubt that super-tartrate of potash proves often a powerful remedy; yet the general remark applies to this as well as to the other diuretics, that it sometimes fails, where others succeed. It is frequently necessary too to give it in such large doses to obtain its diuretic or hydragogue effect, that it excites nausea and flatulence, weakens the appetite, and injures the tone of the stomach: and as a greater degree of debility is induced by the operation of purging than by merely exciting the urinary discharge, there is some risk of the powers of the system being exhausted under its protracted use. These effects, therefore, require to be guarded against, and sometimes render it necessary to substitute other diuretics where it has received a fair trial.

NITRAS POTASSÆ. Nitrate of Potash. Nitrum. Nitre.

THIS salt, consisting of nitric acid and potash, is frequently formed on the surface of the soil, in warm climates. In the south of Europe, its production is accelerated by artificial arrangements. Animal and vegetable substances, in a state of decomposition, are mixed with a quantity of carbonate of lime, the mass is exposed to the air, but protected from the rain, and is occasionally stirred up. After a number of months, the materials are found to contain nitrate of lime and nitrate of potash. These salts are extracted by lixiviation with water: impure sub-carbonate of potash is added, by

which the nitrate of lime is decomposed, and the quantity of nitrate of potash increased; and this salt is purified by repeated solutions and crystallizations. During the process by which the nitrate of potash is formed, it appears that the oxygen of the atmospheric air, and that afforded by the vegetable matter, combines with the nitrogen of the animal matter so as to form nitric acid, which is attracted in part by the lime present, and in part by a quantity of potash, either contained in the materials, or, as some have supposed, actually formed during the process.

Nitrate of potash is crystallized in hexaedral prisms. Its crystals are soluble in six parts of cold, and in an equal weight of boiling water. It is decomposed by heat, affording a large quantity of oxygen gas; and from the facility of this decomposition, is an important pharmaceutic agent in oxidating bodies.

This salt has a cool and sharp taste, and occasions a sense of coldness in the stomach when swallowed. When given in moderate doses, continued for some time, its presence can at length be detected in the urine by chemical tests. Its virtues are those of a refrigerant and diuretic; and, as possessing both, it has been used principally to relieve ardor urinæ in gonorrhœa. The practice, however, is now relinquished, either as inefficacious, or as rather hurtful, if the nitre is secreted with the urine, as it must render it more stimulating. Its dose is from 5 to 20 grains repeated twice or thrice a day, with the free use of diluents or demulcents. Its diuretic power is too inconsiderable to admit of its being employed as a remedy in dropsy.

Offic. Prep.—Troch. Nitrat. Pot. *Ed.*

SPIRITUS ETHERIS NITROSI. Spirit of Nitrous Ether.

NITRIC acid, added in due proportion to alcohol, converts it into a species of ether; but as the process is difficult, from the violent chemical action that takes place, it has long been the practice to use less acid than is required to change the whole alcohol into this product; a portion of nitric ether is formed, and this is

obtained by distillation, combined with the unchanged alcohol, and generally also from the mutual action not having been complete with a portion of free acid. This forms what used to be named Spiritus Nitri Dulcis, what is now named Spiritus Etheris Nitrosi. Its odour is fragrant; its taste sharp and acidulous. In medicine it is employed as a refrigerant and diuretic, in a dose of 20 or 30 drops. Being grateful to the stomach, and relieving flatulence, it is often used to correct or promote the action of more powerful diuretics in dropsy.

DIURETICS FROM THE VEGETABLE KINGDOM.

Scilla maritima. Squill. (Page 255.)

The medicinal applications of squill as an emetic have been already stated. Under this article are to be considered its powers as a diuretic.

Squill, foxglove, and super-tartrate of potash, are the diuretics principally employed in modern practice in the treatment of dropsy; and it is not easy to assign precisely their comparative powers, one frequently proving successful when either of the others has previously failed. Squill operates more directly as a diuretic than the super-tartrate of potash does, and is not liable, even if its administration has been carried rather far, to produce those injurious effects which arise from the action of foxglove in an over dose.

As a diuretic, squill is always given in substance, under the form of the dried root. Its dose is from one to three grains. A grain may be given at first, morning and evening, in the form of pill, and this increased slowly until its diuretic effect is obtained. If the dose is too large, it is liable to excite nausea, and the rule has even been delivered, to give it always to the extent necessary to induce some degree of nausea. The production of this effect can be regarded, however, only as a test of the squill being in an active state; it is not necessary to its diuretic operation; it proves distressing to the patient; and it has been observed, that when it has

once been given to such an extent as to induce this state of the stomach, the same state is more liable to recur even when after an interval it is given in smaller doses. Its nauseating operation, therefore, ought rather to be avoided by the due regulation of the dose.

The diuretic power of squill is much promoted by combination with mercury, and it is more frequently perhaps employed in this combination than alone. Of the mercurial preparations, either the common pill, or calomel, may be used ; the usual medium dose from which we obtain the general action of either on the system, being added to the dose of the squill, or being given in the evening, while the squill is given in the morning. The superiority of their combined action probably depends on the mercury stimulating the absorbent system, while the squill excites the action of the vessels of the kidneys. This combination is farther well adapted to the treatment of dropsy, connected as it frequently is with obstruction or chronic inflammation of the liver or neighbouring organs. Where the mercurial preparation occasions purging, as this impedes the diuretic action of the squill, mercurial friction may be substituted.

DIGITALIS PURPUREA. Foxglove. (Page 138.)

FOXGLOVE has already been considered as a narcotic; it is a still more important article of the Materia Medica as a diuretic. It had frequently been used as an empirical remedy in dropsy; but the occasional violence of its narcotic operation, when not administered with due precaution, prevented it from being employed in practice, until Dr. Withering pointed out, with more precision, the rules to be attended to in its exhibition.

It is difficult, as has been already remarked, to compare the powers of the principal diuretics ; yet, on the whole, perhaps foxglove is superior to all of them in evacuating the water in dropsy : and the conclusions of Withering are still nearly just, that " so far as the re- " moval of the water will contribute to cure the patient,

"so far may be expected from this medicine;" and that "although digitalis does not act universally as a diuretic, it does so more generally than any other."—In hydrothorax, its superiority to other diuretics is more clearly established than in ascites or anasarca; and in the first of these states of dropsy, it is unquestionably superior to any other remedy. Withering remarked, that it was most successful in those cases of dropsy in which debility was completely marked, where the countenance is pale, the pulse weak, and the muscular energy reduced; while, in an opposite state of the system, it was more liable to fail. In the latter case, therefore, he recommended a previous exhibition of squill, or of supertartrate of potash, by which some reduction of strength might be induced. The observation, however, has not altogether been confirmed by subsequent experience. If it were, it would afford strong presumptive proof, that the efficacy of foxglove in dropsy depends on its stimulant action.

There is a peculiarity in its operation, that it may be continued for some time without sensibly increasing the flow of urine; the increase then suddenly commences, and continues of itself without requiring the continued administration of the remedy for several days, and to a very great extent, so that the dropsical effusion is more speedily reduced by the action of it than by any other diuretic. Its diuretic power too appears only when it is administered in dropsy, and hence there can be little doubt that it operates principally, if not entirely, by exciting the action of the absorbents. The absorbed fluid is then discharged by the kidneys. The diuretic effect is not connected with its nauseating operation, or with the reduction in the force of the circulation; it can, on the contrary, be obtained without either of these accompanying it; and Withering remarked even, that he had found the increased discharge of urine to be checked, when the doses had been imprudently urged so as to occasion sickness. He observed also, that if it purges, it is almost certain to fail.

Foxglove is given under the form of the dried leaves in substance, or in infusion or tincture. The tincture has been supposed to be better adapted to its exhibition as a narcotic. The infusion is a preparation sufficiently uniform and active, and its dose is rather more easily regulated with precision, so as to admit of a gradual increase, than that of the powder. Its action too is at once exerted on the stomach, and there is therefore less risk of its effect being delayed until it is accumulated. The medium dose of the powder is at first from half a grain to a grain twice a-day: from half an ounce to an ounce of the infusion, prepared according to the formula of Withering, now received into the Pharmacopœias, is a similar medium dose.

The great desideratum with regard to this remedy, is to conduct its administration so as to obtain its full diuretic effect, without those consequences which arise from it when its action is accumulated in the system. The rules given by Withering for its administration, are to give it in a dose from 1 to 3 grains of the powder twice a-day; or one ounce of the infusion, which, if the symptoms be urgent, or the patient stronger than usual, may be given once in eight hours; and the dose is to be continued until the medicine either acts on the kidneys, the stomach, the pulse, or the bowels; and it is to be stopped on the first appearance of any one of these effects.

Though Withering enjoined strictly the caution necessary in the use of this remedy, the doses prescribed in his directions are perhaps rather large; and the method which has sometimes too been recommended of progressively increasing the dose until the effects are obtained, is improper. If the dose be at first small, or at least if having been raised to one grain of the powder, or one ounce of the infusion, twice in twenty-four hours, it be continued at this quantity, the diuretic operation will be obtained in no long time without any unpleasant symptom, and when it commences, will continue of itself, even though the dose be suspended. Or if, from peculiarity of habit, or state of disease, the dose requires to be increased, it ought to be done slowly, and without

that regularly progressive augmentation which has been recommended. And if the effect begin to cease before the reduction of the dropsical swelling be completed, it may be easily renewed by a repetition of this moderate dose. This mode of administering foxglove is that suggested by the nature of its action. The peculiarity which has always been pointed out as a characteristic of this medicine, is its tendency to accumulate in the system, its effects not appearing for a time, but at length being suddenly induced. There is no necessity, therefore, to increase its dose, or to give one that is large, with the view of speedily inducing its action, since, merely from its continued administration, this will in no long time be established, and without that hazard which is otherwise incurred from this peculiarity in its operation. The alarming symptoms which foxglove is liable to produce, it has already been remarked, are best obviated by small doses of spiritous cordials warm; sulphuric ether, aromatic spirit of ammonia, bitter infusions, and aromatics. Vinegar, which is an antidote to other narcotics, might be tried.

There are other diseases in which foxglove has been supposed to prove useful by its diuretic power; as in insania, or in epilepsy connected with serous effusion in the brain; and more especially in dyspnœa arising from serous effusion in the bronchiæ,—anasarca pulmonum, as this affection is named.

It may, in the treatment of dropsy, be advantageously combined with other diuretics, and its action, like that of squill, is said to be promoted by the operation of mercury.

NICOTIANA TABACUM. Tobacco. (See p. 143.)

TOBACCO, in its general action, has some resemblance to foxglove, being narcotic, emetic, and diuretic. As a diuretic, it has been employed in dropsy, under the form of infusion, one ounce of the dried leaves being infused in a pint of water, and six or ten drops being given, and gradually increased to 60 or even 100. It possesses, however, no peculiar advantage to recommend it, and

its diruetic effect is generally accompanied with sickness and vertigo.

SOLANUM DULCAMARA. Woody Nightshade. Bitter-Sweet. *Pentand. Monogyn. Solanaceæ. Stipites. Indigenous.*

THE young shoots or branches are the part of this plant used in medicine; when first chewed, they have a bitter taste, which is soon followed by a degree of sweetishness, a peculiarity whence its name is derived; their smell is strong and disagreeable. By drying, their activity is much impaired. An infusion or decoction of the dried stalks in water has been recommended as a diuretic in dropsy, but it is a remedy of uncertain operation, and is scarcely ever prescribed.

Offic. Prep.—Decoct. Dulcamar. *Ph. Lond.*

LACTUCA VIROSA. Strong-scented Lettuce. (Page 145.)

THIS plant, though it possesses a narcotic quality, is also a diuretic, and has been recommended under the form of the inspissated juice as a remedy in dropsy, the dose being gradually increased from 5 or 10 grains to 2 or 3 drachms. Though celebrated by the German practioners, it is never used in this country.

COLCHICUM AUTUMNALE. Meadow Saffron. Colchicum. *Hexand. Trigyn. Liliaceæ. Radix. Indigenous.*

THE root of this plant is bulbous; when recent, it is extremely acrid, a small quantity occasioning a sense of burning heat in the stomach, strangury and tenesmus; at other times, it is entirely void of acrimony; differences owing to climate, age, or season. It was recommended by Störck as a remedy in dropsy, under the form of oxymel or syrup; these have been received into the pharmacopœias, the dose of either being 2 or 3 drachms. From the uncertainty however, of its operation, colchicum has not been established in practice.

Offic. Prep.—Syr. Colch. A. *Ed.*—Oxymel. Colch. *Dub.*—Acet. Colch. *Lond.*

GRATIOLA OFFICINALIS. Hedge-Hyssop. *Diand. Monogyn. Personatæ. Herba. South of Europe.*

THE leaves of this plant have a strong bitter taste, with little smell. They prove emetic and cathartic, but

in a smaller dose produce a diuretic effect, and have been recommended under the form of infusion in the treatment of dropsy. Their operation, however, is always uncertain and liable to be violent.

SPARTIUM SCOPARIUM. Broom. *Diadelph. Decand. Papilionaceæ. Summitates. Indigenous.*

THE tops of the young branches of the broom have a bitter taste, which is communicated both to water and alcohol. The watery decoction is used as a popular remedy in dropsy, and sometimes with success. It acts in general both as a cathartic and diuretic.

Offic. Prep.—Extr. Genist. *Ph. Dub.*

JUNIPERUS COMMUNIS. Juniper. *Diœcia. Monadelph. Coniferæ. Baccæ. Indigenous.*

THE berries of this shrub have an aromatic smell, and a warm sweetish taste, with a degree of bitterness, the former qualities residing in a pulp, the last in the seeds. Distilled with water they afford a considerable quantity of essential oil.

Juniper berries given in infusion prove diuretic. The essential oil retains this property; and the spirit of juniper, or diluted alcohol impregnated with it, has been prescribed as a cordial, and diuretic in dropsy.

Offic. Prep.—Ol. Juniper. Spir. Junip. C. Comp. *Ed. Lond. Dub.*

COPAIFERA OFFICINALIS. Balsamum Copaibæ. Balsam of Copaiba or Copavia. *Decand. Monogyn. Dumosæ. Balsamum. South America.*

THIS resinous juice, for it is improperly named a balsam, is the produce by exudation from incisions made in the trunk of the tree. It is thick and tenacious, transparent, with a yellow tinge; has a peculiar smell not disagreeable, and a pungent bitter taste. It is soluble in alcohol, and in expressed and essential oils. Distilled with water, it affords nearly half its weight of an essential oil, an insipid resin being the residuum.

Balsam of Copaiba increases the urinary discharge, and communicates to the urine a violet odour. In too large a dose it is liable to excite inflammation of the

urinary passages. From its power of stimulating these parts, it frequently proves successful in the cure of gleet, where the inflammation has entirely subsided, and the discharge continues from weakness of the exhalants or absorbents. It has also been given in leucorrhœa, and in hæmorrhoidal affections. Its dose is 20 or 30 drops twice or thrice a-day, given in the form of bolus, or what is preferable, as remaining more easily on the stomach, and less irritating, diffused in water by the medium of mucilage.*

PINUS BALSAMEA. Balsamum Canadense. Canadian Balsam. *Monœcia. Monadelph. Coniferæ. Balsamum. North America.*

THIS resinous juice, for it like the preceding, is improperly named a balsam, as it affords no benzoic acid, exudes spontaneously from the trunk of the tree. It is of a light yellow colour, transparent, tenacious, and inflammable. By age it becomes thicker; its smell is agreeable, its taste pungent. It is soluble in alcohol and oils, and affords an essential oil by distillation, similar to the oil obtained from the other turpentines or resinous juices, of the different species of pinus.

The medicinal virtues of this resinous juice seem to be the same as those of copaiba, and it is used for the same purposes. Its dose is from 30 to 50 drops. Of any of the turpentines it is the purest.

* It is now upwards of ten years since I have trusted exclusively to the Balsam Copavia in the cure of gonorrhœa, and my confidence in its powers is fully established. Contrasted with the ordinary mode of treating the disease by injections, this plan has a decided superiority. It is more convenient to the patient. It produces no swelled testicle. It occasions no strictures. It leaves no gleet. It is more prompt and certain in the cure.

This is no new practice. The Copavia was once much employed in gonorrhœa, but limited chiefly to the advanced stages of the disease, and the doses were small. My experience has taught me to pursue an entirely opposite course. I prescribe the medicine at the very commencement of the attack, utterly regardless of all the appearances of inflammation, and exhibit it freely. Nothing more speedily abates the ardor urinæ, chordee and other troublesome affections. It will sometimes be useful to combine with the Copavia the dulcified spirit of nitre, and a considerable portion of laudanum.

If judiciously administered, the Copavia will commonly effect a cure in three or four days, and sometimes in a much shorter period. I have known

Pinus larix. Terebinthina Veneta. Venice Turpentine. *Monoecia. Monadelph. Coniferæ.*

This juice exudes spontaneously, and in still greater abundance from incisions in the trunk of the tree. It is thick and tenacious, semi-pellucid, of a yellowish colour, has a peculiar smell, and a bitter pungent taste. By distillation, with the addition of a small quantity of water, to prevent the temperature from rising too high, it affords a large quantity of an essential oil, which is light, volatile, and inflammable, but more sparingly soluble in alcohol than any other essential oil. The residuum is a resin nearly insipid.

Venice turpentine derives all its virtues from its essential oil, and it is this oil, Oleum Terebinthinæ, Oil of Turpentine, that is used in medicine, more frequently than the juice itself. It is a powerful stimulant, directed more particularly in its action to the urinary passages, as is evident from the violet odour it communicates to the urine, and from the inflammation it excites when given in too large a dose. From this specific action it has been employed in gleet in a dose from 5 to 10 drops, but its operation is always liable to be violent. It was highly recommended by Cheyne as a remedy in chronic rheumatism, especially lumbago, given to the extent of 2 or 3 drachms mixed with honey. It is scarcely possible, however, to give it in such a dose without being rejected from the stomach, or acting violently on the urinary organs. Externally it is applied by friction, as a stimulant to parts affected with cramp and rheumatism; sometimes too it is used as an application to burns, or as a styptic to bleeding wounds.

Resina Alba vel Flava. White or yellow resin is the

it often to put an end to the disease in less than twenty-four hours. But to attain this free and prompt operation of the medicine, the patient must honestly abstain from every stimulating article of diet or drink, and impose upon himself a complete state of rest. Without these precautions, this and all other modes of managing gonorrhœa are counteracted and abused.

I have also found the Copavia very serviceable in relieving the strangury from blisters.—Ed.

residuum of the distillation of turpentine; its various shades of colour arising from the purity of the juice, or from the degree of heat applied. It has little smell or taste, but appears from the practice of the farriers, who give it to horses, to have some degree of diuretic power. It is only employed in the composition of ointments and plasters, which it renders more adhesive, and perhaps more stimulating. Various compositions of this kind have a place in the pharmacopœias, as the Ceratum Resinæ, or Unguentum Resinosum, long known by the name of Basilicon, the Emplastrum Resinosum and others.

PISTACIA TEREBINTHINUS. Chio or Cyprus Turpentine.—PINUS PICEA. Strasburgh Turpentine.—PINUS SYLVESTRIS. Common Turpentine. *Diœc. Pentand.*

THE Chio turpentine is more fragrant and grateful than the preceding; its powers are the same, and not being easily procured, it is never used. The same observation may be made with respect to the Strasburgh Turpentine, the produce of the Pinus Picea. The Common Turpentine, (Terebinthinus Communis,) the produce of the Pinus Sylvestris, contains less essential oil, and is more offensive to the stomach than any of the other turpentines.

DIURETICS FROM THE ANIMAL KINGDOM.

MELOE VESICATORIUS. Cantharis. Spanish Fly. Lytta Vesicatoria. Blistering Fly. *Coleoptera.*

THIS insect is collected from the leaves of certain plants in Spain and Italy, to which it adheres; they are first exposed to the vapours of vinegar, and are then dried in the sun. They are of a rich, lively green and yellow colour; have a faint unpleasant smell, and a taste slightly acrid. The active matter of cantharides inflames and excoriates the skin, and is used as the basis of the common vesicatories. It appears to have a peculiar de-

termination to the urinary organs, as even from the external application strangury is sometimes induced; and a small dose of the cantharides internally administered acts with much violence on the kidneys and bladder, producing inflammation and a discharge of bloody urine. In dropsy, it has been given as a diuretic in a dose of one grain once or twice a-day, continued for some time: it has been prescribed in a similar dose in obstinate gleet and leucorrhœa, and in return of urine arising from debility of the body of the bladder, or in the opposite affection of incontinence of urine. It is principally in the latter of these affections that the internal administration of cantharides is attempted,—where the inability to retain the urine arises from weakness of the sphincter vesicæ, a state which the cantharides by its local stimulant action is adapted to remove. Its action requires to be moderated by the free use of diluents. It has also been employed as a stimulant in amenorrhœa; and it is still more extensively used externally as an epispastic.

Offic. Prep.—Emp. Mel. Ves. T. Mel. Ves. Ung. Pulv. Mel. V. *Ph.Ed. Lond. Dub.*—Emp. Mel. Vesic. Comp. Ung. Inf. Mel. V. *Ed.*—Emp. Calefac. *Dub.*

CHAPTER XI.

DIAPHORETICS.

Diaphoretics are those medicines which increase the natural exhalation by the skin. When they excite this so copiously as to produce sweat, they are named Sudorifics. The operation of both is the same, differing only in degree; diaphoretics in doses sufficiently large acting as sudorifics, and sudorifics in diminished doses, or under peculiar circumstances, occasioning only a slight diaphoresis. The fluid effused too is in both cases alike, being chiefly the watery part of the blood, with a

slight impregnation of saline matter. In the one case is is discharged more slowly, and therefore passes off in the state of vapour ; in the other it is discharged copiously from the exhalant vessels in the liquid form.

The operation of these medicines is not obscure ; the natural exhalation is merely increased ; the action of the exhalant vessels on the surface must therefore have been augmented, and the substances belonging to this class must be those which stimulate these vessels.

Of stimuli of this kind, external heat affords an example ; it is directly applied to the vessels, and must occasion in them an increased action ; hence it often produces sweat, and always promotes the action of sudorifics.

The same effect may be likewise produced by a different operation,—by increasing the general force of the circulation, this acts as a stimulus on the exhalant vessels, and increases their discharge. Hence violent muscular exercise is perhaps always attended with copious sweating.

In one or other of these modes, the medicines belonging to this class operate—either by directly stimulating the cutaneous exhalant vessels, or by indirectly communicating to them an increased action by increasing the force of the circulation.

The saline diaphoretics seem to act in the former manner ; they have little or no action on the vascular system, neither increasing the velocity nor force of the circulation ; their action therefore is exerted on the stomach, and thence communicated to the vessels of the skin. Perhaps they may likewise be absorbed into the mass of blood, as they readily pass with the chyle, or enter the absorbent vessels, and may act more directly on the cutaneous vessels.

Those diaphoretics, on the contrary, which are more stimulating, probably act by increasing the force of the vascular system, as they usually augment the force and frequency of the pulse, previous to occasioning sweat.

Diaphoresis is not, however, the necessary consequence of the circulation being increased in force ; for

it often happens that the pulse is frequent and hard, when the skin remains dry. In this case there seems to exist a constriction of the exhalants, sufficient to resist the impetus of the blood, and whatever can remove this will favour sweating. Diaphoresis, therefore, it may in general be said, will follow from increased vascular action, when the exhalants of the skin are not morbidly constricted; and it will take place still more copiously when the circulation is increased in the larger vessels, while the exhalants themselves are relaxed. On this view is to be explained the operation of tepid diluents, and of external warmth in promoting sweat, the tendency of both being to increase the force of the circulation, and at the same time occasion relaxation of the cutaneous vessels. From the latter effect, small doses of emetics are favourable to diaphoresis; and, from the same principle, the superior sudorific power of the combination of opium with ipecacuan, or the preparations of antimony, may perhaps be accounted for; the primary operation of the one being to increase the action of the vascular system; that of the other, by its nauseating effect, to diminish the action at the surface, as is apparent from the paleness of the skin, and the sense of coldness with which nausea is attended.

The primary effects of diaphoretics are to evacuate the watery part of the blood, and thus lessen the quantity of it in the circulating system; to determine the blood to the surface from the internal parts; to increase the action of the absorbents, and to remove spasmodic stricture of the cutaneous vessels, and render the skin moist and relaxed.

It is doubtful, however, whether the first of these effects takes place to any extent; for, during sweating, there is generally considerable thirst: as much fluid may therefore be taken in, as will supply what is thrown out; and farther, the other fluid secretions, particularly that of urine, are diminished during this operation. It is probable, therefore, that little alteration takes place in the quantity of fluid contained in the body from the

action of diaphoretics; and we can scarcely, in any case, ascribe any beneficial effects they produce to this cause.

The last effect is perhaps the most important; at least it is on this principle, the removing spasmodic stricture of the cutaneous vessels, that the efficacy of diaphoretics in inflammatory diseases has been explained. In such affections the skin is dry, and the external heat augmented; but when diaphoresis has been induced, that state is removed, and the skin remains moist and cool. It is with the view of producing these effects that diaphoretics are used in synocha, acute rheumatism, and in the various phlegmasiæ.

Several circumstances contribute to lead physicians to the free use of diaphoretics in fevers. The skin is generally dry and hot; and it was often observed, that a spontaneous salutary crisis was marked by diaphoresis, or even by a copious sweat. Hence, it was concluded, that by following the path nature pointed out, and inducing this relaxed state of the vessels of the skin, the disease might be removed. Theory too had its influence in carrying this practice to an immoderate extent, fever being supposed to arise from the presence of morbific matter in the system, and sweating being an evacuation by which it was supposed to be discharged. The limits to the practice have long been established; little advantage appears to be derived from it in the treatment of fevers of the typhoid type, and it is principally in the various phlegmasiæ that it is employed.

As evacuating the serous part of the blood, and as promoting absorption, sudorifics have been sometimes employed in the different species of dropsy, especially in anasarca, in which the circulation in the extreme vessels on the surface is more or less languid. Cases occur where it is not easy to increase the discharge by urine, and in these, sweating has been had recourse to, as less debilitating than purging, the only other evacuation that can be excited with advantage. It has been remarked too, that the operation of diaphoretics, when

it has been excited, has been accompanied by an increase in the quantity of urine, a proof of absorption having been promoted. It is difficult, however, to excite sweating in dropsy, and the practice is rarely attempted.

By determining to the surface, and preserving a gentle diaphoresis, they are found serviceable in asthma, dyspepsia, habitual diarrhœa, chronic dysentery, and chronic rheumatism.

In various obstinate cutaneous affections, as herpes and lepra, advantage has been derived from the use of diaphoretics, probably from altering the morbid state of the extreme vessels on the surface. The use of the warm bath, and the antimonial and mercurial diaphoretics, are found more particularly serviceable in such affections.

Several circumstances require to be attended to in the administration of sudorifics. If the disease is inflammatory, the action of the vascular system strong, and the skin dry, with great heat on the surface, those which are of the stimulating kind are to be avoided, as if they fail in producing sweat, they may aggravate the symptoms. The free use of warm diluents is proper and even necessary, under the operation of full sweating. The patient should be laid in flannel, not only as preserving the temperature more uniform, but also as it absorbs the moisture which would otherwise carry off the heat too rapidly, and cool the surface. The covering ought rather to be light, as there is no necessity for much external warmth. Too much heat, especially when unaccompanied by humidity, sometimes rather prevents sweating, probably by stimulating the exhalant vessels, and increasing their force of resistance. It is promoted by partial fomentation, as the application of flannel dipped in warm water, and pressed out, to the feet. Lastly, care is to be taken to avoid the application of cold, either by the admission of cold air to the surface, or the drinking of cold water while the sweat continues, or for some time after it has ceased. When the sweat is to be checked, it is best done by

drying the surface, removing the patient into dry flannel, and allowing him to expose his hands and arms to the air.

The particular diaphoretics may be arranged according to the affinity of their operation, as they operate by increasing the action of the vascular system, or as they act without any sensible stimulant operation, though it is somewhat difficult to trace the distinctions of these, or even with regard to every individual to assign the kind of action it exerts.

DIAPHORETICS.

Acetas ammoniæ.
Citras ammoniæ.
Carbonas ammoniæ.
Murias ammoniæ.
Sub-murias hydrargyri:
Antimonium.
Sulphur.
Opium.
Camphor.
Guaiacum officinale.
Daphne mezereum.
Laurus sassafras.
Salvia officinalis.

Acetas ammoniæ. Acetate of Ammonia.

All the ammoniacal salts are supposed to have a diaphoretic power. The acetate is the one which has been principally used; its solution (Aqua Acetatis Ammoniæ) having been long celebrated under the name of Spirit of Mindererus (Spiritus Mindereri) as a diaphoretic in febrile affections. It is prepared by neutralizing

distilled vinegar, by adding to it carbonate of ammonia, the carbonic acid being disengaged with effervescence, and the acetate of ammonia remaining in solution. Its strength must be various, according to the degree of concentration of the vinegar, and hence it is given in divided doses, an ounce being given every hour or two, and its operation promoted by tepid diluents and the sweating regimen. As it produces no increase of vascular action, it has been supposed well adapted to exhibition in inflammatory fevers, as synocha and acute rheumatism, and it is in such cases that it is usually employed. Its diaphoretic power, however, there is reason to suspect, is not very great, though it may be employed perhaps with some advantage when its operation is promoted by the addition of small proportions of opium and antimony. Externally it is used as a discutient, and sometimes as an application to inflamed parts.

Citras Ammoniæ. Citrate of Ammonia.

Lemon juice, neutralized by potash, affords a remedy, which has long been employed under the name of Saline Mixture, as a refrigerant in fever. When it is neutralized by ammonia, it is supposed, along with its refrigerant, to have a diaphoretic power. Citric acid being the chief constituent ingredient of the juice of the lemon, this preparation is of course a citrate of ammonia. In the diluted state in which the mixture is prepared, it can have no great power ; but its diaphoretic operation is sometimes promoted by the addition of a few drops of tincture of opium and antimonial wine.

Carbonas ammoniæ. Carbonate of Ammonia.

This salt is employed either under the solid form, or in a state of solution. In the former state, it is obtained by sublimation from a mixture of muriate of ammonia and carbonate of lime, the heat applied giving rise to a double decomposition, and the carbonate

of ammonia being sublimed. It forms a concrete mass, white and efflorescent, which retains the pungent ammoniacal odour, and which, as it also changes the vegetable colours to a green, is probably to be regarded as a sub-carbonate. Its solution (Aqua Carbonatis Ammoniæ) is prepared by distilling water from a mixture of muriate of ammonia and sub-carbonate of potash, carbonate of ammonia being formed, sublimed, and dissolved by the water which distils over. Under either form it is used as a stimulant, and sometimes as a sudorific, its dose being 10 or 15 grains of the concrete salt, and from half a drachm to a drachm of the solution. Its operation is promoted by the sweating regimen. As a stimulant, the solution is given in a similar dose in languor or faintness; and the concrete salt is applied to the nostrils, forming what is named the pungent smelling salt.

Murias ammoniæ. Muriate of Ammonia. Sal Ammoniacus. Sal Ammoniac.

This salt is prepared by various processes, on a large scale, for the purposes to which it is applied in the arts. The greater number of these consist in obtaining an impure ammonia from animal substances by distillation, combining it with sulphuric acid, and decomposing this sulphate of ammonia by muriate of soda, the muriate of ammonia formed from the mutual action of these compound salts being sublimed. It is thus obtained in a solid dense mass, somewhat ductile and semi-transparent. It is soluble in about three parts of cold water, and may be crystallized from its hot solution. In medical practice it is little employed. It has been supposed, in the dose of one drachm, to act either as a diuretic or diaphoretic, according to the mode in which it is administered; the first effect being obtained when the surface of the body is kept cool; the other when external warmth is applied, with the use of tepid diluents. It is also sometimes applied externally as a discutient, dissolved in distilled vinegar. But it has

a place in the pharmacopœias principally as being employed in pharmacy.

HYDRARGYRI MURIAS MITIS. Sub-murias Hydrargyri. Mild Muriate of Mercury. Sub-muriate of Mercury or Calomel. (Page 277.)

THIS preparation of mercury is sometimes employed to obtain its action on the cutaneous vessels; and in certain diseases, particularly eruptions on the surface, and chronic rheumatism, has been supposed to prove useful by increasing the insensible perspiration. Combined with opium, or with guaiac, it has been supposed to exert a still greater degree of diaphoretic power.

ANTIMONIUM. Antimony. (Page 242.)

A sympathy appears to exist between the stomach and the surface of the body, in consequence of which the state of the one is to a certain extent communicated to the other; the nauseating effect, for example, of emetics being accompanied with diminished action at the surface. This effect is apparently produced by the preparations of antimony; and some of them, particularly the oxide of antimony with phosphate of lime, and the tartrate of antimony and potash, are hence employed as diaphoretics in febrile affections. The former is given in a dose from 5 to 10 grains, repeated every third or fourth hour, until its operation as a sudorific, cathartic or emetic, is produced; the latter being given in a dose of one-half or one-fourth of a grain in a similar manner. The action of both is aided by warm diluents, and sometimes that of the tartrate of antimony and potash is rendered more certain and powerful by combination with opium. The sulphuret of antimony levigated has been employed as a remedy in some cutaneous diseases, and chronic rheumatism; and has been supposed to operate by increasing the insensible perspiration.

SULPHUR. Sulphur. (Page 268.)

SULPHUR, it has already been remarked, passes off by the cutaneous vessels, and with some increase, it has been supposed, of the insensible perspiration. Hence has been explained the advantage sometimes derived from it in habitual dyspnœa, and in chronic catarrh. The solution of it in oil, Oleum Sulphuratum, has been used in the same cases, but is a preparation both acrid and nauseous.

OPIUM. Opium. (Page 121.)

OPIUM, in a pretty large dose, produces sweat, particularly when its operation is promoted by diluents and external warmth. It is difficult, however, to employ it alone as a sudorific, from its narcotic power being necessarily exerted at the same time. But by combination with antimony or ipecacuan, a modification of power is produced, more important perhaps than any other arising from the combination of remedies; the narcotic operation of the opium is in a great measure prevented, the nauseating effect of the ipecacuan or antimony is also diminished, and we obtain a sudorific more powerful and certain than any other. In the combination with antimony, thirty-five drops of antimonial wine are usually added to twenty-five of tincture of opium. The combination with ipecacuan is still more powerful. It is an officinal preparation (Pulvis Ipecacuanhæ et Opii), and consists of one part of ipecacuan, one of opium, and eight parts of sulphate of potash; these being rubbed together into a fine powder, the sulphate of potash rendering this more easy by dividing the opium, and lessening its tenacity. This has long been celebrated as a sudorific, under the name of Dover's Powder, and is the medicine which is uniformly employed where copious sweating is to be induced, as in acute rheumatism, in anasarca, and in every other disease in which this indication is to be fulfilled. Its medium dose is ten grains, given generally in a bolus; its operation is promoted by

tepid diluents and external warmth, the patient being confined to bed. If it fail in producing sweat, other five grains may be given at the end of an hour, and sometimes even it is necessary to give a larger dose. When it operates, the sweating is generally profuse, and by the proper management can be kept up for several hours. The power of the combination probably depends on the joint action of the opium and ipecacuan, the former increasing the force of the circulation, the latter, by its action, propagated to the surface, diminishing the resistance in the exhalant vessels, and causing, therefore, the fluid to be more easily and copiously poured out. Such is the effect of this modification, that the combination can be given with safety in pure inflammatory affections, attended with increased vascular action, where the exhibition of opium alone would be attended with hazard.

CAMPHORA. Camphor. (Page 118.)

CAMPHOR has been employed as a diaphoretic in acute rheumatism, in different forms of fever, and in several of the exanthemata, particularly small pox, in a dose from 5 to 15 grains. Its operation as a sudorific is not sufficiently certain, however, when it is given alone. Sometimes it is combined with nitre, with antimonials, mild muriate of mercury or opium.

GUAIACUM OFFICINALE. Guaiac. *Decand. Monogyn. Gruinales. Lignum et Gummi resina. South America and West Indies.*

THE wood of this tree, and a concrete resinous substance obtained by exudation from incisions in its trunk, are the parts of it used in medicine.

The wood is hard and heavy, of a yellowish colour, has little smell, and a slightly warm bitter taste. Its virtues depend on the small portion of resinous matter which it contains.

Guaiac wood was introduced into practice as a remedy in the treatment of lues venerea, and was at one time even considered capable of effecting a radical cure.

Its powers are now better ascertained. It is employed merely as an auxiliary, and sometimes with advantage, in promoting the action of mercury in the confirmed state of the disease, and in alleviating the various symptoms which arise from a protracted mercurial course. It is likewise occasionally prescribed in cutaneous diseases, in scrofulous affections, and in chronic rheumatism. The form under which it is administered, is always that of decoction, for which a formula is given in the pharmacopœias. A quart of this is drunk in the course of the day. If taken warm it produces diaphoresis.

Offic. Prep.—Dec. Guaiac. Off. Comp. *Ed.*

GUAIACUM. Gummi-Resina.

THIS is obtained by exudation from incisions made in the trunk of the guaiac tree. It is friable, of a greenish or grayish colour, and resinous lustre, has an odour somewhat fragrant, and a warm bitterish taste. It was usually regarded as a gum resin, but the experiments of Mr. Brande have shown that it possesses some peculiar properties, whence it has been regarded as a distinct principle. It is very liable to changes of colour, apparently from the action of oxygen. Its powder is at first of a gray colour, but becomes green from exposure to the air; and when its solution in alcohol is decomposed by acids, the precipitate assumes various tints of colour. When acted on by concentrated nitric acid, it affords oxalic acid; by the diluted acid a product is formed more highly resinous. It is almost entirely soluble in alcohol. Water by digestion on it dissolves a little extractive matter.

Guaiac is a stimulating medicine, proving diaphoretic in a dose of about half a drachm, and purgative in a larger dose. It is a remedy employed in chronic rheumatism, being given so as to excite sweat, or more usually in smaller doses to keep up a gentle diaphoresis. Its sudorific power is promoted by opium or the preparations of antimony. It is given either in sub-

stance in the form of bolus, or diffused in water by the medium of mucilage, or in tincture. The tincture of it in spirit of ammonia is more highly stimulating than that in proof-spirit, and is generally preferred.

Offic. Prep.—T. Guajac. T. Guajac. Amm. *Ed. Lond. Dub.*—Mist. Guaiac. *Lond.*

DAPHNE MEZEREUM. Mezereon. *Pentand. Monogyn. Vepreculæ. Cortex radicis. Indigenous.*

THE bark of the root of this plant is the part of it used in medicine: its taste when it is chewed for some time is extremely acrid; but this acrimony is somewhat impaired by drying; it is extracted by water and by vinegar.

Mezereon is a stimulating diaphoretic, which by determining to the surface of the body, has been found of service in chronic rheumatism, and in cutaneous diseases. Its principal medicinal application has been in syphilis; and it has been regarded as peculiarly efficacious in removing venereal nodes, and thickening of the ligaments and periosteum, and in disposing ulcerations to heal. It is given in the form of decoction; 2 drachms of the bark, with half an ounce of liquorice root, being boiled in three pounds of water, to 2 pounds, and 4 or 6 ounces of this decoction being given four times a-day. From its acrimony it is somewhat liable to excite nausea, hence it is often given in a weaker decoction, and combined with guaiac and sarsaparilla. Such a combination forms the Decoctum Sarsaparillæ Compositum, an improved formula for the Lisbon diet drink, which has been so highly celebrated in the treatment of these affections.

Offic. Prep.—Dec. Daphn. Mez. *Ed.*

LAURUS SASSAFRAS. Sassafras. *Enneand. Monogyn. Oleraceæ. Lignum. America.*

THIS wood has a moderately fragrant smell, and a sweetish aromatic taste. It affords an essential oil by distillation, and yields to water, by infusion or decoc-

tion, its flavour, and part of its taste. It is slightly stimulant and diaphoretic. Its infusion has been drunk freely in cutaneous diseases, and in chronic rheumatism; and it is frequently added to decoctions of sarsaparilla, guaiac and mezereon, probably without communicating any real virtue.

Offic. Prep.—Ol. Laur. Sassaf. *Ph. Ed.*

SALVIA OFFICINALIS. Sage. *Diand. Monogyn. Verticillatæ. Folia. South of Europe.*

THE leaves of this shrub have an aromatic smell, and a warm bitterish taste. Its aqueous infusion drunk warm, has been used to produce sweat, or to promote the action of sudorifics; the aromatic quality of the sage adding something perhaps to the power of the warm diluent.

CHAPTER XII.

OF EXPECTORANTS.

EXPECTORANTS have been defined, those medicines which facilitate, or promote the rejection of mucus, or other fluids from the lungs and trachea. The theory that has been given of their mode of operation, is extremely obscure and hypothetical. It has been supposed, that in certain diseases, a greater quantity of serous fluid is thrown out by the exhalant vessels in the lungs than the absorbents can take up, and that expectorants facilitate the rejection of this fluid. But as expectoration of this kind is a complicated, and partly voluntary operation, dependant on the action of a variety of muscles, it is difficult to perceive how these remedies can produce this effect. There are only two classes of medicines which seem capable of promoting expectoration in this manner: powerful stimulants, which, when

extreme debility is present, may promote it by giving vigour to the voluntary muscles exerted in this operation, and emetics, which, by exciting vomiting, compress the thoracic viscera, and by calling all the neighbouring muscles into strong action, and rendering both expiration and inspiration more forcible, may facilitate the expulsion of matter from the cavity of the lungs. But these exert no specific action, and are therefore not entitled to the appellation of expectorants; nor indeed are they usually considered as such.

If, therefore, by expectorants, are understood substances capable of promoting, by some specific action on the parts concerned, the expulsion of fluid from the lungs, there seems no reason to believe in the existence of such remedies.

Dr. Cullen after admitting the difficulty of giving a satisfactory theory on this subject, supposes that the promoting of expectoration by these remedies may be owing to their "increasing the secretion of the liquid, that is, to afford a mucus: this, as it is poured from the arteries into the follicles, being always a thin fluid, it may dilute the mucus in the follicles, and may cause it to be poured out from these in a less viscid state, and thereby render it more easy to be brought up by coughing, that is, to be more freely expectorated."

It is possible that some expectorants may act in this manner; but the action of the different individuals belonging to the class, and especially their action in different diseases, cannot always be explained on this principle. It is probable that there are several modes of operation, in which certain medicines may appear to promote expectoration, and which may give them a claim to the title of expectorants.

In the first place, by removing constriction on the exhalant vessels in the lungs, expectoration will appear to be promoted. From this constricted state, the usual quantity of fluid is not thrown out to lubricate these parts: expectoration must of course be more scanty than usual; and if medicines be given capable of removing

the constriction, expectoration will become more copious. At the same time, the disease will be at least partially relieved, as that morbid state of the vessels, from which some of its symptoms originate, is removed. It is apparently by such a mode of operation that the promoting of expectoration is of service in pneumonia, catarrh, and asthma, the principal diseases in which expectorants are employed.

The remedies by which such an effect is induced, according to this mode of operation, must be principally those belonging to the class of antispasmodics, or those which have the power of inducing nausea, either of these being capable by their action of removing constriction of the exhalant vessels.

It is not possible, however, to reduce all the medicines ranked as expectorants to this mode of operation. On the contrary, some of them seem to act on a very different principle. In certain diseases, as in humoral asthma and catarrhus senilis, there seems to be, from debility of the exhalants, or from deficient action of the absorbents, an increased quantity of fluid in the lungs. There appears to be certain substances more peculiarly determined to the pulmonary vessels, as their odour is discernible in the air expired. These may stimulate the exhalant vessels through which they pass, and by this stimulus may moderate the effusion of fluid, and thus render the expectoration of the remainder more easy. Any medicine promoting absorption of this effused fluid, will to a certain extent have a similar effect.

There is still another mode in which the quantity of fluid in the lungs may be diminished, that of determining to the surface of the body, so as to increase the insensible perspiration ; and it is probable, that some of the substances which have been used as expectorants, particularly those connected with the class of diaphoretics, owe what virtues they have to this operation.

Expectorants are not then to be regarded as medicines, which assist the rejection of a fluid already secreted, or which, according to Dr. Cullen's opinion, alter its consistence, and render it thin where it is too viscid, by

which its expulsion is rendered more easy. They are rather to be considered either as increasing the natural exhalation, where it has been deficient, in which case, the expectoration that takes place is the consequence of this, and not the cause of any relief that is afforded; or as diminishing the quantity of fluid where it is too copious, either by stimulating the exhalant vessels, increasing the action of the pulmonary absorbents, or determining to the surface of the body, by which diminution the expulsion of the remaining fluid is facilitated. On one or other of these principles, we may, with sufficient probability, explain the effects of this class of remedies and their application to the treatment of diseases.

From this difference in the mode of operation of expectorants, it is evident that they will prove useful in opposite diseases, and that in some diseases, advantage may be derived from those belonging to one division, but not from the others.

In pneumonia, where the expectoration is deficient, as this arises not from any deficiency of power to expectorate, but from a diminution of the fluid usually thrown out into the bronchiæ, owing to a constricted state of the exhalant vessels, it is evident that those expectorants which act by removing such a state, will be most useful, while such expectorants as stimulate these vessels would be rather prejudicial. Hence the utility in such cases of nauseating doses of tartrate of antimony, or of ipecacuan; and similar advantage may be derived from their use in catarrh, and perhaps also in spasmodic asthma. On the contrary, where the effusion of fluids into the bronchiæ is too great, as in humoral asthma, or in the chronic catarrh to which old people are subject, those expectorants which are more directly stimulant, as the different balsams, and several of the gum-resins, as myrrh or ammoniacum, so those which promote absorption, as squill or fox-glove, will be found more useful. In considering the particular expectorants, they may be arranged as nearly as possible according to these subdivisions.

EXPECTORANTS.

Antimonium.
Ipecacuanha.
Digitalis purpurea.
Nicotiana tabacum.
Scilla maritima.
Allium sativum.
Polygala senega.
Ammoniacum.
Myrrha.
Myroxylon peruiferum
Toluifera balsamum.
Styrax benzoin.
Styrax officinale.
Amyris gileadensis.

Antimonium. Antimony. (Page 242.)

Of the preparations of antimony which have been employed as expectorants, the principle are the hydro-sulphuretted oxide, and the tartrate of antimony and potash. The first, under the forms of what are named Kermes mineral, and golden precipitate of antimony, was at one time celebrated as a remedy in pertussis and in pneumonia, in a dose of from 5 to 10 grains; but being uncertain in its strength, has fallen into disuse. The tartrate of antimony and potash is used in the same cases, and in some forms of asthma and catarrh, in the dose of one-eighth of a grain, repeated every second or third hour. It is also frequently combined with squill and other expectorants.

Ipecacuanha. Ipecacuan. (Page 253.)

Ipecacuan, operating in the same manner nearly as antimony, has like it been used as an expectorant in a dose of two or three grains. It is, however, less frequently employed.

Digitalis purpurea. Foxglove. (Page 138.)

Digitalis is employed with much advantage in humoral asthma,—dyspnœa aquosa, and in catarrhus senilis, obviously from its power of promoting absorption, by which it removes the fluid accumulated in the lungs apparently from diminished action of the absorbents. By diminishing the quantity of this fluid, it facilitates the expectoration of the remainder, and hence appears to act as an expectorant, and it relieves the difficulty of breathing, and the irritation to which its accumulation gives rise. In such cases, it is proper to give it rather in small doses, than to push its operation to any great extent; a grain of the dried leaves, or half an ounce of the infusion daily, will be a sufficient dose.

Nicotiana tabacum. Tobacco. (Page 143.)

Tobacco has been celebrated as an expectorant in chronic catarrh and humoral asthma, under the form of the watery extract, the dose of which is two or three grains. Its general action being similar to that of foxglove, it no doubt operates in these morbid affections on the same principle, though probably much inferior to the other.

Scilla-maritima. Squill. (Page 255.)

Squill, next to its employment as a diuretic in dropsy, is most frequently used as an expectorant; and it is more particularly in those cases where there is an accumulation of the pulmonary mucus that it is prescribed; hence it probably operates by its power of promoting absorption. In inflammatory states of the system, where, from constriction of the pulmonary vessels, the exhalation is diminished, it is probably less useful; it has even been considered injurious in pneumonia, unless when combined with tartrate of antimony. As an expectorant, it is also used in pertussis, and in that disease is frequently given in such a dose as to produce vomiting. In all these cases it is generally used under

the form of the vinegar or syrup of squill, the dose of the former being half a drachm, of the latter a drachm, repeated every third or fourth hour. The squill pill is sometimes used in chronic catarrh in a dose of 10 grains daily.

ALLIUM SATIVUM. Garlic. *Hexand. Monogyn. Liliaceæ. Radix. South of Europe.*

THE root of this plant, which is of the bulbous kind, has, when recent, a fœtid smell and acrid taste. By being long kept it becomes shrivelled and inert. Its taste and smell are extracted by water by infusion; by decoction they are nearly lost. By distillation it affords an essential oil odorous and acrid.

Garlic has a considerable analogy to squill, and its operation is probably nearly the same; it acts as a diuretic, diaphoretic, and expectorant; hence its use in dropsy, rheumatalgia, and humoral asthma. Its dose is half a drachm or 2 scruples, swallowed whole, or made into pills with soap. A syrup prepared by digesting it in vinegar, and boiling the liquid with the due proportion of sugar, has been used as an expectorant. Externally garlic bruised is applied as a stimulant and rubefacient.

Offic. Prep.—Syr. Alii. *Ph. Dub.*

POLYGALA SENEGA. Seneka. Rattlesnake-root. *Diadelph. Octand. Lomentac. Radix. North America.*

THIS root is in articulated shoots of a grayish yellow colour; its taste is bitter and pungent. Its active matter is extracted partially by water with the assistance of heat and completely by alcohol.

Seneka has been frequently employed as an expectorant in pneumonia, after the highly inflammatory stage of the disease has been subdued. Its dose in substance is from 10 to 20 grains, but it is generally used in the form of decoction, of which, when prepared according to the formula of the Edinburgh College, an ounce, or an ounce and a half may be given every second or

third hour. As it operates also as a diuretic, it is probable that its efficacy depends on its power of increasing absorption, and hence that it is more adapted to those cases where there is an accumulation of fluid in the bronchiæ, than to affections of an opposite nature.

Offic. Prep.—Dec. Polygal. Seneg. *Ed. Lond.*

AMMONIACUM. Ammoniac. *Gummi-resina.*

THIS gum-resin is brought from Egypt and the East Indies; the tree which produces it having not been accurately known. The London College have now, on the authority of Wildenow, designated it as the Heracleum Gummiferum, this having been raised by that botanist from the seeds often found mixed in the gum ammoniac of the shops. It is in large masses, or, when of the best quality, in small round fragments, yellow on the surface, and white within. It has a faint smell, and a nauseous taste. It is partially soluble in alcohol. Water triturated with it forms a milky-like mixture, from which, on standing, a resinous matter subsides.

Gum-ammoniac is principally employed as an expectorant, and is frequently prescribed in asthma and chronic catarrh. Its dose is from 10 to 30 grains; either given under the form of a pill, or diffused in water, and frequently combined with squill or tartrate of antimony. Externally it is applied as a discutient, under the form of plaster, to white swelling of the knee, and to indolent tumors, being beat into a soft mass with vinegar, and spread on leather.

Offic. Prep.—Emp. Amm. Emp. Ammon. cum Hydr. *Lond.*—Mist. Ammon. *Lond. Dub.*

MYRRHA. Myrrh. *Gummi-resina.*

MYRRH is the produce of Arabia and Abyssinia; the plant from which it is obtained has never yet been accurately described. It is in small irregular pieces of a reddish brown colour, has a smell rather fragrant, and a warm bitter taste. It consists of gum and resin; the latter appearing to constitute its active matter. Alcohol

dissolves the resin, and the solution is rendered turbid by the affusion of water. Water boiled on the myrrh dissolves the gummy matter, to which part of the resin adheres, and this evaporated affords the watery extract, which is less active than the myrrh itself.

Myrrh is an expectorant, which has been regarded as too stimulating to be employed in pneumonic inflammation, but which has been often employed in asthma and chronic catarrh, and sometimes in phthisis. Its dose is from 10 to 20 grains. The watery extract, which has been preferred by many physicians to the myrrh itself, and which is the form under which it has been used in phthisis, seems to be an injudicious preparation, as the myrrh is merely weakened in power. Myrrh is also sometimes employed in amenorrhœa. Its tincture is in common use as a stimulating application in sponginess of the gums, and sometimes also to foul ulcers.

Offic. Prep.—Tinct. Myrrh. *Ph. Ed. Lond. Dub.*

MYROXYLON PERUIFERUM. Balsamum Peruvianum. Peruvian Balsam. *Decand. Monogyn. Lomentaceæ. South America.*

THIS balsam is said to be extracted by boiling the bark and young branches of the tree with water; it has also been affirmed that it is obtained by exudation. It is thick and viscid, of a reddish-brown colour, has a strong smell somewhat fragrant, and a bitter pungent taste. It affords a small portion of essential oil by distillation, and of acid of benzoin by sublimation. Its remaining matter is resinous. It is entirely soluble in alcohol.

Peruvian balsam is considerably stimulant. It has been employed as an expectorant in catarrh and dyspnœa, more particularly in those forms of these diseases where the secretion of pulmonary mucus is increased, and may perhaps be of some advantage in stimulating the exhalants or absorbents. It has likewise been prescribed as a remedy in paralysis, chronic rheumatism, and leucorrhœa. Its dose is from 5 to 15 grains, and it

is best given diffused by mucilage, or made into pills by any vegetable powder.

Offic. Prep.—T. Bals. Per. *Lond.*

TOLUIFERA BALSAMUM. Balsamum Tolutanum. Balsam of Tolu. *Decand. Monogyn. Lomentaceæ. South America.*

TOLU balsam is obtained from incisions in the trunk of the tree; it thickens, and in time becomes concrete, and of a resinous fracture and appearance; it has a fragrant odour, and a warm sweetish taste. It dissolves entirely in alcohol, and communicates its odour and taste to water by boiling. It contains a small quantity of acid of benzoin.

This is the mildest of all the balsams. It has been used as an expectorant, and its tincture or syrup, sometimes enters into the composition of mucilaginous mixtures used in catarrh, but its powers are very inconsiderable, and it is employed principally on account of its flavour.

Offic. Prep.—Syr. Toluif. Bals. *Ph. Ed. Lond.*—Tinct. Toluif. B. *Ed. Dub.*

STYRAX BENZOIN. Benzoinum. Benzoin or Benjamin. *Decand. Monogyn. Bicornes. Balsamum. India.*

THIS balsam is obtained by exudation; it is in brittle masses, composed of brown and white fragments; its smell is fragrant; it has little taste. It consists almost wholly of resin, and is therefore nearly entirely soluble in alcohol. It likewise contains a considerable portion of that peculiar acid, which, as it exists in greater quantity in it than in any other vegetable matter, is named Benzoic acid. This is obtained from it by sublimation, or by decoction with water, and, likewise by boiling it with potash or lime, with either of which it combines, and is afterwards separated by the addition of an acid. It is in white brilliant scales, retains the flavour of the benzoin, and with acidity has likewise a degree of pungency.

Benzoin is rarely employed in medicine. Its acid is

used as an expectorant in asthma, in a dose of 10 or 15 grains; but it is probably a medicine of little power. It enters into the composition of the ammoniated and camphorated tinctures of opium, and is scarcely applied to any other use.

Offic. Prep.—T. Benz. C. *Ed. Lond. Dub.*

STYRAX OFFICINALE. Storax. *Decand. Monogyn. Bicornes. Balsamum. South of Europe, Asia.*

THIS substance is in masses soft and slightly unctuous, of a brown colour, with scarcely any resinous lustre or appearance; it has a strong fragrant odour, and a bitterish pungent taste. It consists principally of resin, with a small portion of benzoic acid. It resembles benzoin in its virtues; was formerly used as an expectorant, but is now little regarded. The purification of it, ordered in some of the Pharmacopœias, is altogether superfluous.

Offic. Prep.—Styrax. Purif. *Ph. Lond. Dub.*—Pil. Styrac. *Dub.*

AMYRIS GILEADENSIS. Balsamum Gileadense. Balsam or Balm of Gilead. *Octand. Monogyn. Dumosæ. Arabia.*

THIS balsam, obtained by incisions made in the trunk of the tree, is in the form of a milky juice, highly fragrant, and is so much valued in the East, that it is said not to be imported into Europe. A coarser kind is obtained by strong decoction of the branches and leaves, of a yellow colour, and thick consistence; its taste is warm and bitter; its flavour somewhat fragrant. What is met with in the shops, under the name of Balsam of Gilead, is a resinous juice having none of these qualities, and probably the produce of a different plant. It seems little superior to the finer kinds of turpentine.

The medicinal virtues of the genuine balsam of Gilead have been very highly extolled, undoubtedly with much exaggeration. The common balsam is scarcely used; but its qualities seem to be similar to those of the balsam of Peru, with more acrimony.

CHAPTER XIII.

OF SIALAGOGUES.

Sialagogues are substances which increase the salivary discharge. This may be effected either by the mastication of substances, which, by their acrimony and pungency, excite the action of the vessels which secrete the saliva, or by the internal exhibition of certain medicines. Of the latter, mercury is the only certain sialagogue; and all its preparations, when administered in certain quantities, produce salivation to a greater or less extent.

As a class of remedies, sialagogoues are of little importance. The sialagogue operation of mercury, it has already been remarked, does not appear essential to its efficacy in any disease, but is regarded merely as a test of the mercury acting on the system. The acrid sialagogues, by increasing the secretion of saliva, and by their pungency, sometimes relieve the pain of toothach, and have been supposed useful, by the derivation they occasion, in some kinds of headach.

SIALAGOGUES.

Hydrargyrus.
Anthæmis pyrethrum.
Arum maculatum.
Cochlearia armoracia.
Daphne mezereum.
Amomum zingiber.
Nicotiana tabacum.

HYDRARGYRUS. Quicksilver. (Page 164.)

No satisfactory explanation has been given of the peculiarity which mercury, under every form of preparation, has of exciting the secretion of the saliva. Some have remarked that in consequence of the gravity of this metal, by which, when received into the circulation, it is disposed to retain the "direct line in which it is propelled from the heart, it is more certainly determined to the vessels of the head," a solution of the difficulty which is altogether absurd. It has likewise been supposed to act by lessening the consistence of the blood, and disposing it to pass more easily into the salivary glands, so as to increase their secretion,—an opinion equally gratuitous and improbable. Dr. Cullen endeavoured to solve the problem, by supposing that mercury has "a particular disposition to unite with ammoniacal salts, and that such salts are disposed to pass off by the salivary glands more copiously than by any other excretion." But mercury has no peculiar tendency of this kind; and if it had, these salts are not more abundant in the saliva, than in some other secretions. If another hypothesis might be hazarded, the following perhaps would afford some explanation of this singular property. The urine appears more peculiarly designed to convey matter which has been received into the circulating mass, but which is still excrementitious, from the system. To pass, however, with this fluid, it is necessary that the matter conveyed should be soluble in it; and when it is so, we can discover it in the secretion by chemical tests. If there is any property connected with it, therefore, which shall prevent this solubility, it probably will prevent the substance from being secreted. Now, the phosphoric acid, abundant in urine, must in this mode counteract the secretion of mercury in any form of preparation, by forming with it a compound insoluble, and to which the slight excess of acid cannot communicate solubility. The mercury, therefore, existing in the circulating mass, when brought, in the

course of the circulation, to the secreting vessels of the kidneys, will not pass through their whole course, but if conveyed so far as to be combined with phosphoric acid, will, from this combination, be incapable of being conveyed onwards, and will therefore be retained in the composition of that part of the blood which does not enter into the secretion, but returns into the circulation. It must be discharged by some other emunctory: a portion of it appears, from some facts, to pass off by the insensible perspiration; but the tenuity of this secretion, if the term may be employed, must be unfavourable to this mode of discharge. The salivary secretion is one by which it may be more easily transmitted; and this transmission may even be facilitated by the affinity exerted to the oxide of mercury by the muriatic acid, the soda and ammonia, which are the chief saline ingredients in saliva; for it deserves to be remarked, that triple compounds of these substances,—a soda-muriate, and ammoniaco-muriate of mercury, are to a certain extent soluble in water, and if the mercury is thus secreted, it will of course stimulate the secreting vessels through which it passes, and increase the discharge.

The increase in the salivary discharge, effected by mercury, is attended with pain and a sense of heat in the mouth, with softness and swelling of the gums, and sometimes with slight ulceration, or with a considerable degree of swelling, extending over the throat and face. These effects, when excessive, are best checked by the use of opium, of purgatives, of a blister applied to the throat, and, as Mr. Pearson has recommended, free exposure to a cool dry air. From theory, the administration of sulphur, or sulphuret of potash, has also been recommended.

The remaining Sialagogues act only by topical application.

Anthemis pyrethrum. Pellitory of Spain. *Syngenes. Ploygam. superfl. Compositæ. Radix. South of Europe.*

This root, though cultivated in this country, is gen-

erally imported from Spain. In taste it is hot and acrid, its acrimony residing in a resinous principle, which alcohol dissolves, forming a very acrid tincture. It is a remedy which, from stimulating the salivary glands, and exciting a discharge of saliva, is used in toothach, and sometimes gives relief. It has also been chewed in palsy of the muscles of the throat.

ARUM MACULATUM. Wake-Robin. *Gynand. Polyand. Piperitæ. Radix. Indigenous.*

THE root of this plant, when recent, is extremely acrid; by drying, its acrimony is much impaired. In digesting it with alcohol, or with water, and evaporating either solution, an extract is obtained less acrid than the root itself; the vapour condensed has not much acrimony, and hence the principle in which this property resides appears to be one very easily decomposed. It resembles pellitory, and may be applied to the same purposes, but its pungency is unpleasant. Internally, it has sometimes been used as a stimulant in palsy and rheumatism.

COCHLEARIA ARMORACIA. Raphanus rusticanus. Horse-radish. *Tetradyn. Silic. Siliquosæ. Radix. Indigenous.*

THE root of this plant, when recent, has a penetrating taste, with a degree of sweetness. It excites, when chewed, a sense of heat, and a discharge of saliva. Its pungency resides in an essential oil, and is therefore lost by drying. Water and alcohol may be impregnated with it.

Horse-radish is a stimulant, which, as a sialagogue, has been used in paralysis of the tongue. It has also been used internally in paralysis and rheumatism, in asthma and dropsy, about a drachm of the recent root cut in small pieces being swallowed entire. Externally it has been applied as a rubefacient, and its syrup has been used as a remedy for hoarseness.

Offic. Prep.—Infus. Armorac. Comp. *Lond. Dub.* —Spir. Armorac. Comp. *Ph. Lond.*

DAPHNE MEZEREUM. Mezereon. (Page 318.)

THE bark of the root of mezereon has a very considerable degree of acrimony, so that when chewed it impresses a sense of heat and irritation in the mouth and upper part of the throat, and at the same time excites the salivary discharge. As a sialagogue, however, it is scarcely used.

AMOMUM ZINGIBER. (Page 208.)

GINGER-ROOT, from its pungency, excites, when masticated, a sense of heat and increased discharge of saliva, and is sometimes, like other sialagogues, employed to relieve the pain of toothach.

NICOTIANA TABACUM. Tobacco. (Page 143.)

TOBACCO, when chewed, increases the action of the salivary glands, and the same effect is produced in the usual method of smoking it. Partly from this, and partly from its narcotic operation, exerted at the same time to a certain extent, it sometimes relieves, especially in the latter mode of using it, the pain of toothach, or of ear-ach.

CHAPTER XIV.

OF ERRHINES.

ERRHINES or Sternutatories, are substances which occasion a discharge from the nostrils, either of a mucous or serous fluid. They all operate by direct application, and generally in consequence of a sligtly acrid quality. Any substance in fine powder snuffed up the nostrils has this effect in a certain degree ; but it is, as is to be expected, more copious as the substance is

more acrid or stimulating. The discharge, as produced by different errhines, varies in extent, and in the time during which it continues. Some also occasion a sense of heat, or even inflame the membrane to which they are applied, while others have no such effects.

It is evident, that the effects of this class of remedies must be very limited, as applied to the treatment of disease. By the evacuation they occasion, it has been supposed that they diminish the quantity of fluid circulating in the neighbouring vessels; hence they have been inferred to be useful in rheumatic affections of the muscles of these parts, and in toothach. It has even been supposed, that their effects may extend to all the branches of the external carotid, and Dr. Cullen mentions, that he has, apparently from this operation, known headach, pain of the ear, and some cases of ophthalmia, cured or relieved by the use of errhines. He has likewise supposed, that they may have been of use in preventing apoplexy or palsy; this at least should, he remarks, be so far attended to, that whenever any approach to these diseases is suspected, the drying up of the mucous discharge should be attended to, and if possible obviated.

ERRHINES.

Iris florentina.
Æsculus hippocastanum.
Origanum majorana.
Lavandula spica.
Rorismarinus officinalis.
Asarum europæum.
Veratrum album.
Nicotiana tabacum.
Euphorbia officinalis.
Sub-sulphas hydrargyri.

IRIS FLORENTINA. Florentine Orris. *Triand. Monogyn.—Ensatæ. Radix. South of Europe.*

THE root of this plant, freed from its outer bark, is of a white colour, has a pleasant odour, and slightly bitter taste. It is a mild sternutatory, and enters into the composition of some cephalic snuffs.

ÆSCULUS HIPPOCASTANUM. Horse Chesnut. *Heptand. Monogyn. Trihilatæ. Semen: Cortex.*

THE fruit of this tree is principally farinaceous; and this farina acts as a sternutatory. The bark is bitter, and has been proposed as a substitute for Peruvian Bark.

ORIGANUM MAJORANA. Sweet Majorum. *Didynam. Gymnosperm. Verticillatæ. Herba. South of Europe.*

THE leaves of this herb have an aromatic odour, and, when dried and reduced to powder, a slight errhine power.

ROSMARINUS OFFICINALIS. Rosemary. *Diand. Monogyn. Verticillatæ. Summitates florentes.*

THE flowers and flowering tops of this plant have a fragrant odour, which resides in an essential oil. It is used as a stimulating perfume, under the form of the distilled spirit, and the powder is sometimes mixed with other errhines.

Offic. Prep.—Ol. Ess. Rorism. Spirit. Rorism. *Ph. Lond. Dub. Ed.*

LAVANDULA SPICA. Lavender. *Didynam. Gymnosperm. Verticillatæ. Spicæ florentes. South of Europe.*

☞ LAVENDER flowers have a fragrant smell, and a warm bitterish taste. They yield a quantity of essential oil, which is employed in medicine as a stimulant, when combined with alcohol, and other aromatics, under the form of what is named Compound Spirit of Lavender. The simple spirit or solution of the oil in alcohol is

used as a perfume, and the dried leaves in powder are errhine.

Offic. Prep.—Spir. Lavand. T. Lavand. C. Ol. Lavand. *Ph. Ed. Lond. Dub.*

NICOTIANA. Tobacco. (Page 143.)

THE leaves of tobacco are in common use as an errhine ; their powder forming the different kinds of snuff.

ASARUM EUROPÆUM. Asarabacca. *Dodecand. Monogyn. Sarmentaceæ. Folia. Indigenous.*

THE leaves of this plant possess rather more errhine power than those heretofore noticed, and are employed as the basis of the official sternutatory powders.

Offic. Prep.—P. Asar. Europ. C. *Pharm. Ed. Dub.*

VERATRUM ALBUM. Helleborus Albus. White Hellebore. *Polygam. Monæc. Liliaceæ. South of Europe.*

THE root of this plant has a strong disagreeable smell when fresh, which is lost by drying, and an acrid taste which is retained. Snuffed up the nostrils in very small quantity, it excites violent sneezing, with a sense of heat, and a copious discharge of thin mucus. It is therefore sometimes used as a sternutatory mixed with some of the milder and more fragrant errhines. Taken internally, in the dose of a few grains, it acts as a violent emetic and cathartic. Externally, when mixed with lard, so as to form an ointment, or in the form of decoction, it is used as an application in some cutaneous disdeases.

Offic. Prep.—T. Verat. A. *Ed.*—Dec. Verat. Ungt. Verat. *Lond.*—Ung. Helleb. A. *Dub.*

EUPHORBIA OFFICINALIS. *Dodecand. Trigynia. Gummi-resina. Africa.*

THIS substance, which is of a resinous nature, is said to be obtained by exudation from incisions in the branches of the plant producing it. It is in small round

fragments, having scarcely any smell, but a very acrimonious taste. Its operation as a drastic purgative is so violent, that it is never given internally. Its powder is the most violent of all the errhines, occasioning a copious discharge of mucus, with a sense of heat, and even inflammation. Hence it is scarcely ever employed. Externally it has been used as a rubefacient or vesicatory.

SUB-SULPHAS HYDRARGYRI. Sub-Sulphate of Mercury.

THIS preparation of mercury is an errhine, and has been employed in chronic ophthalmia and amaurosis; one grain of it being mixed with six or eight grains of any mild vegetable powder, and snuffed up the nostrils occasionally.

CHAPTER XV.

RUBEFACIENTS AND EPISPASTICS.

RUBEFACIENTS and Epispastics operate nearly on the same principle, and produce similar effects, differing only in degree. They may therefore be considered as sub-divisions of one class.

The term Epispastic has been applied to whatever application has the power of producing a serous or puriform discharge, by exciting a previous state of inflammation or suppuration. The term includes blisters, issues, and setons; but it is more commonly restricted to the first of these, and it is this which chiefly falls under the department of Materia Medica.

Blisters are those external applications which excite inflammation on the skin, and which, occasioning a thin

serous fluid to be poured from the exhalants, separate the cuticle from the true skin, and form the appearance of a vesicle or blister.

The mode in which they produce this effect is sufficiently evident; it is to be referred to the stimulating power of the substances applied, which exciting increased action in the extreme blood-vessels, induces inflammation, and causes the pouring out of the serous fluid with which the vesicle is filled. Hence we deduce the primary effects of these applications on the general system. By the increased action they excite, and the pain they occasion, they act as stimulants, and they may act, it has been supposed, as evacuants, by the quantity of fluid which they cause to be poured out.

There can now be little dispute by which of these modes of operation blisters are used with advantage in the treatment of diseases. The quantity of fluid discharged is so inconsiderable, and the relief obtained often so sudden and complete, that it would be assigning a very inadequate cause for their effects, if we should ascribe these to any evacuating power.

Some have imagined that cantharides, which form the basis of the common blistering applications, are absorbed in part by the inflamed surface, and that it is to the peculiar action of this acrid matter stimulating the system, that many of the effects of blisters are owing. But there is no proof, nor indeed any reason to believe, that this absorption is uniform or frequent; the same effects are obtained from blistering applications into the composition of which cantharides do not enter, while they are not obtained from the internal administration of catharides. The effects of blisters are therefore to be ascribed to the pain and inflammation they excite, and the stimulus which is thence propagated to the general system.

It is a principle with regard to the living body, demonstrated by many facts, that where a morbid action exists, it may be often removed by inducing a different action, even of a morbid kind, in the same part, or in

parts as contiguous to it as possible; and where the morbid action extends to the whole system, it may be removed by one of a different kind being excited either generally, or in any particular part of the body.

From this principle is explained the efficacy of blisters in all cases of inflammation and spasmodic constriction; a new inflammation being excited by the blister which occasions derivation of action. Hence, too, the advantage obtained is greater when the blister is applied as near as possible to the part affected. This principle regulates the application of blisters in pneumonia, hepatitis, phrenitis, angina, ophthalmia, rheumatism, and every other case of active inflammation. In these affections, blisters are used with evident advantage; the local inflammation which is excited more than counterbalancing, by this operation, the stimulant effects at the same time produced.

A similar principle exists with respect to the pain excited by blisters, which may also be applied to the explanation of the advantages derived from them in other diseases. It has long been remarked, that exciting one pain often relieves another, and hence blisters afford relief in toothach, and other painful affections. Epilepsy and hysteria arising fom irritation have been removed by blisters; apparently from their exciting pain, engaging the attention, and diminishing the sensibility to irritation.

Lastly, blisters exert a stimulant operation on the general system, and raise the vigour of the circulation. Hence their utility in fevers of the typhoid kind, where extreme debility prevails. From their peculiar operation too, they are the only remedy that can be used to obviate the local inflammation of the brain, or other parts, that sometimes exists in fevers of this kind, as they contribute to resolve it without reducing the strength of the system.

It is also from their stimulating power, and perhaps from exciting pain, that blisters are of advantage in apoplexy and paralysis.

RUBEFACIENTS operate precisely in the same manner as blisters; they excite pain and inflammation, but only in an inferior degree, so that no fluid is discharged; and by these effects they more peculiarly obviate local inflammation. They are used therefore for the same purposes.

EPISPASTICS AND RUBEFACIENTS.

MELOE VESICATORIUS.
EUPHORBIUM.
PIX BURGUNDICA.
SINAPIS ALBA.
ALLIUM SATIVUM.
AMMONIA.

CANTHARIDES. Meloe Vesicatorius. Lytta Vesicatoria.

UNDER the history of this substance as a diuretic, it has been remarked, that it is a still more important article of the Materia Medica as an epispastic. It is the substance, indeed, which is now almost exclusively employed to raise a blister, as it acts with certainty, and is not liable to induce that deep-seated ulceration, which sometimes follows the application of other acrid substances that have been used for the same purpose. The cantharides in powder are mixed with lard and wax, so as to form a plaster of a proper consistence, which is applied to the part, generally for 10 or 12 hours: at the end of that time, the proper vesicle is usually formed; it is then cut, to allow the serous fluid to be discharged, and the inflamed part is dressed with any mild ointment. Camphor has been sometimes added to the blistering plaster, with the view of obviating the strangury which is liable to be occasioned. But it is very doubtful if it has any such effect: the plentiful use of diluents, while

the blister is applied, prevents it much more certainly; and it is always proper when a blister is applied, especially if large, or in inflammatory diseases, to order the patient to drink freely of any mild diluent liquor. Where the strangury does occur, from the application of a blister, is is relieved by an enema of tepid water, with a little of expressed oil, and 30 drops of tincture of opium.

In some diseases, as in apoplexy, it is of importance to be certain of the operation of an epispastic, and to have its effect produced in a short time. To attain these a compound plaster is ordered by the Edinburgh College, Emplast. Meloes Vesicat. Comp. in which the stimulating and epispastic power of the cantharides is increased by the addition of other acrid substances, burgundy pitch, turpentine, verdigris, mustard and pepper.

After a blister has been raised, it is often of advantage to convert the serous discharge into one of a purulent nature, by exciting suppuration, or to form what is termed an Issue: this can easily be effected by the application of any acrid stimulating ointment; one composed of wax and oil, with a small proportion of cantharides, is commonly used for this purpose, as by the irritation it excites, it keeps up the inflammation, and at length produces suppuration. Any foreign body retained on the inflamed part answers the same purpose. What are named Orange Peas, the small unripe fruit of the orange, polished, are usually employed, as by their odour they cover the fœtor of the discharge. One of these is retained on the blistered part by a slip of adhesive plaster, and by the irritation it occasions keeps up a constant discharge. A seton, or cord introduced by means of a needle, answers the same purpose. When by any of these methods a puriform discharge is established in a part, considerable effects arise from the morbid action which it continues, and the evacuation it occasions. It is a practice often employed with

advantage in asthma, paralysis, and a number of chronic affections.

EUPHORBIUM. Euphorbia Officinalis. (Page 337.)

THIS resinous substance, already considered as an errhine, is a powerful vesicatory. It enters into the epispastic compositions of the farrier, and might be employed, mixed with other epispastics, when it is of importance to obtain the effects of a blister in their full extent, speedily and with certainty.

PIX BURGUNDICA. Burgundy Pitch. Pinus Abies. *Monœcia. Monadelph. Coniferæ.*

THIS resinous concrete is obtained by exudation from incisions made in the trunk of the tree. It is boiled with a small quantity of water; is strained; and when cold forms a concrete resinous matter, retaining a little essential oil. As a rubefacient, it is spread upon leather, and applied to the skin: it excites a slight degree of inflammation, and an exudation of serous fluid, without entirely separating the cuticle, so as to produce a blister. Hence it is less painful in its operation, and the application of it can be continued for a considerable time. It is used with advantage in catarrh, pertussis and dyspnœa.

Offic. Prep.—Emp. Pic. Burg. *Dub.*

SINAPIS. Mustard. (See page 256.)—The flour of mustard-seed, mixed with an equal part of wheat-flour or crumbs of bread, and made into a paste with vinegar, forms what is named a Sinapism, an application which acts as a powerful rubefacient. It is applied to the soles of the feet in typhoid fevers, where there is extreme debility, or determination to the head. It is used in the same manner in comatose affections; the application of it in either case being continued for an hour or two. It soon excites a sense of pain, and if applied long produces inflammation.

Offic. Prep.—Catap. Sinapeos. *Lond. Dub.*

Allium. Garlic. (See p. 325.)—The bruised root of this plant, applied to the soles of the feet, produces effects similar to those of the sinapism, and is used for the same purpose. It is less powerful, and its odour is ungrateful.

Ammonia. Ammonia.

The solution of ammonia in water (Aq. Ammoniæ) is obtained by decomposing muriate of ammonia by lime, with the assistance of heat, the ammonical gas being absorbed by water, through which it is transmitted. The solution has a very pungent odour, and applied to the skin acts as a rubefacient. The common form under which it has been employed, is mixed with two or three parts of expressed oil, with which it forms a thick saponaceous compound, formerly known by the name of Volatile Liniment. A piece of flannel moistened with this, and applied to the skin, soon excites pain and superficial inflammation. It is often employed instead of a blister to the throat, in angina tonsillaris, being less painful, yet frequently effectual. It is also sometimes applied by friction to relieve the pain of rheumatism.

Offic. Prep.—Ol. Ammon. *Ed. Dub.*

THIRD DIVISION.

OF CHEMICAL REMEDIES.

Under this division are comprised those few classes of medicines, the operation of which either depends entirely on the chemical changes they produce, or is materially modified by these changes. I have placed under it the classes of Refrigerants,, Antacids, Lithontriptics, and Escharotics.

CHAPTER XVI.

OF REFRIGERANTS.

The substances arranged by authors on the Materia Medica under the appellation of Refrigerants, have been usually defined, such medicines as directly diminish the force of the circulation, and reduce the heat of the body without occasioning any diminution of sensibility or nervous energy. The theory delivered of the operation of these medicines is unsatisfactory and obscure; nor are even the facts adduced to establish the existence of such a class of remedies altogether precise. It is acknowledged by Dr. Cullen, that "in many trials made on purpose, it did not appear that the supposed refrigerants diminished that temperature of the body, which is the ordinary temperature of it in health." He concludes, therefore, that the definition should apply only to the reduction of the temperature when it has been morbidly increased; and even in this case the effect

of these medicines is allowed by practical writers not to be considerable.

It is not necessary to review the opinions that have been advanced on the mode of operation of these substances, since they are in general absurd and unintelligible. Dr. Cullen, in particular, gives an explanation on this subject, founded on the most obscure and hypothetical ideas, and which, indeed, it is scarcely possible to understand. Its basis, he remarks, is a doctrine delivered by Needham, "that there is every where in nature an expansive force and a resisting power; and that, particularly under a certain degree of heat, the expansive power appears in all the parts of organized bodies, in consequence of which they show a singular vegetating power; while, at the same time, in other bodies there is a power resisting and preventing the action of this vegetating power, and at least of diminishing its force." This power, it is added, is found in those saline substances commonly supposed to be refrigerants; and, "as an increase of heat is no other than an increase of the expansive force in the heated parts, it may be understood, how resisting powers may diminish any preternatural expansive force and heat in our bodies."

The discoveries of Modern Chemistry furnish some facts, which may perhaps be applied to this subject; and indeed it is only to those discoveries which establish the source of animal temperature, that we are to look for an explanation of the changes to which it is subject.

It is established by numerous experiments and observations, that the consumption of oxygen in the lungs is materially influenced by the nature of the ingesta received into the stomach. When the food and drink are composed of substances which contain a small proportion of oxygen, it is known that the consumption of oxygen in the lungs is increased, and this even in a short time after the aliment has been received. Thus Mr. Spalding, the celebrated diver, observed, that whenever he used a diet of animal food, or drunk spir-

itous liquors, he consumed in a much shorter time the oxygen of the atmospheric air in his diving bell; and therefore he had learned from experience to confine himself to a vegetable diet, and water for drink when following his profession. During digestion too, it was established by the experiments of Lavoisier and Seguin, that a larger proportion of oxygen than usual is consumed.

But it is known that the animal temperature is derived from the consumption of oxygen gas by respiration; and that an increase in that consumption will occasion a greater evolution of caloric in the system, and consequently an increase of temperature in the body, while a diminution in the consumption of oxygen will have an opposite effect.

If, then, when the temperature of the body is morbidly increased, we introduce into the stomach substances containing a large proportion of oxygen, especially in a loose state of combination, we may succeed in reducing the general temperature. This we accomplish in part by a vegetable diet, but still more effectually by the free use of *acids*. The vegetable acids in particular, which by experience are found to be the best refrigerants, are readily acted on by the digestive powers, and assimilated with the food. And as the large quantity of oxygen they contain is already in a concrete state, little sensible heat can be produced by the combination of that element with the other principles of the food. The nutritious matter which is received into the blood, containing thus a larger proportion of oxygen than usual, will be disposed to abstract less of it from the air in the lungs, and consequently less caloric will be evolved. The temperature of the body will be reduced, and this again operating as a reduction of stimulus, will lessen the number and force of the contractions of the heart.

It might be supposed, however, that any effect of this kind must be very trivial; and it actually is so; for we find in practice that refrigerants produce no sudden

or great change. They operate slowly, and have little other effect than moderating the morbidly increased temperature. The whole of their effects, as Dr. Cullen remarks, are so slowly produced, as not to be very evident to our senses, nor easily subjected to experiment, being found only in consequence of frequent repetition.

This is probably the action of acids. The other refrigerants, the neutral salts, perhaps act in a similar manner; the acid they contain may yield oxygen; but they are still less effectual than acids, and their refrigerant power is even problematical, except in so far as they operate on a principle different from that which has been pointed out,—the power they have of producing in the stomach a sensation of cold. If a draught of cold water be swallowed, the sensation of cold it produces in the stomach is equivalent to a partial abstraction of stimulus, which being extended by sympathy to the heart, occasions a transient reduction in the force of the circulation, and by this, or by a similar sympathetic affection, causes a sensation of cold over the body. Nitre is an example perhaps of a refrigerant acting in this manner. It excites a sensation of cold in the stomach, even when taken dissolved, and still more in the solid state; and this is quickly followed by a reduction in the number and force of the pulsations. Hence nitre acts more suddenly than any of the other refrigerants, and is more transient in its operation. It may also however operate in some degree more permanently, in the same manner as the vegetable acids; as it appears that nitre, from the florid colour which it gives to blood, parts with oxygen readily.

It is evident that the indication to be fulfilled in the treatment of disease by the use of refrigerants, is the reduction of the morbidly increased temperature. Hence the propriety of their administration in synocha and other pure inflammatory diseases, and in typhus fever; in both of which the temperature of the body is increased, though from different causes. In inflamma-

tory diseases, the circulation being so much more rapid than usual, a greater quantity of blood is sent both through the whole body and through the lungs in a given time; and the usual alterations of the blood going on, the evolution of caloric, which is the consequence of these alterations, must be increased, and the temperature raised. In such cases, the use of acids, by lessening the disposition of the blood to consume oxygen in the lungs, may be useful in reducing the temperature; and nitre may be of advantage, as it diminishes the force of the contractions of the heart; but these means, it is evident, can have only a trivial effect, compared with those direct evacuations by which the force of the circulation is lessened.

The increased temperature in typhus fever cannot be ascribed to the same cause, but seems rather owing to the absorption of the animal solids constantly going on, and which, containing comparatively little oxygen, cause the blood to consume more of it in the lungs. The introduction of acids into the system, by affording this element in a concrete state to that matter, will lessen the consumption of it in the lungs, and will of course moderate the morbidly increased temperature. In either of these forms of disease, therefore, refrigerants may be useful, and accordingly we find them very generally used in all the species of febrile affection; though they are still to be regarded as medicines of weak power.

REFRIGERANTS.

CITRUS MEDICA.
CITRUS AURANTIUM.
TAMARINDUS INDICA.
ACETUM.
SUPER-TARTRAS POTASSÆ.
NITRAS POTASSÆ.
BORAS SODÆ.

ALL acids are supposed to be Refrigerants; but the vegetable acids are allowed to possess this power in a more eminent degree,—a superiority which, according to the preceding view, must be founded on their being more easy of assimilation, and of being acted on by the chemical processes of the living system.

The native vegetable acids are found chiefly in the fruits of vegetables. The sour juice of these fruits consists of the Citric or Malic Acid, or more frequently of a mixture of both, sometimes with the addition of tartaric acid. The citric acid is that which is most largely employed, as it forms chiefly the acid juice of the orange and lemon, the two acid fruits in common medicinal use.

CITRUS MEDICA. Lemonum. Lemon. (Page 203.) *Succus fructus. Acidum. Concretum.*

THE juice of the fruit of the lemon consists almost entirely of citric acid, diluted with a portion of saccharine and mucilaginous or gelatinous matter. As the fruit cannot always be procured, various methods have been employed to preserve the juice. The most effectual is to add to the expressed juice a portion of alcohol, and to put it aside until the mucilaginous matter is deposited, then by a moderate heat to evaporate the al-

cohol, and preserve the acid juice in bottles carefully closed. Even as prepared in this method, however, the juice is liable to chemical change.

By a different process, the citric acid can be procured pure and in a crystallized state. To the expressed lemon juice gently heated, carbonate of lime is added so as to neutralize it; citrate of lime is formed, and being insoluble is precipitated; it is washed with water to carry off the extractive and mucilaginous matter, and is then submitted to the action of sulphuric acid; which, when digested or boiled on it for a short time, combines with the lime, and disengages the citric acid; and by evaporation and cooling, this is obtained in a crystallized form. This process was originally given by Scheele, and it has been received in the London Pharmacopœia.

Lemon juice may be regarded as the principal refrigerant, being adapted to cool and quench thirst, and used for these purposes in febrile affections. A grateful beverage is formed from it, diluted largely with water, and sweetened a little with sugar: or the fruit sliced down is added to any mild diluent. A preparation from it, which is used as a refrigerant in fever, is what is named the Saline mixture, formed by neutralizing lemon juice by the addition of a sufficient quantity of carbonate of potash, adding to this, water with a little sugar and a small portion of any distilled water. Of this mixture, a table-spoonful is taken occasionally; it is grateful, but cannot be considered as possessed of any power, any refrigerant quality which may belong to the acid being probably lost by its neutralization.

Another form under which lemon juice is used in fever, principally with the view of relieving nausea or checking vomiting, is that of the Effervescing Draught, as it has been named. A solution of carbonate of potash, and diluted lemon juice are mixed together, and while in the act of effervescence, the mixture is swallowed. The efficacy of it is probably dependant on the pungency and stimulant operation of the carbonic acid,

but it affords a grateful form under which this can be administered.

The juice of the lemon, and indeed the citric acid, as it exists in any vegetable fruit, has been long known as nearly an infallible remedy in scurvy: a theory of its operation in removing this disease has been given, founded on its chemical agency, and particularly on the supposition that it imparts oxygen to the system, but which cannot be regarded as established.

Lemon juice was employed as a remedy in syphilis, at the time nitric acid received a trial, and cases were given in which it proved successful. These, however, are doubtful, and it has never been established in practice.

The crystallized citric acid may be supposed to have the same power as the native lemon juice. This, however, is somewhat uncertain, especially with regard to the treatment of scurvy, the disease in which the medicinal agency of this acid is most important. It is also deprived of the agreeable flavour of the lemon juice, and is hence even a less grateful refrigerant in fever, though this may be communicated to it, to a certain extent, by infusing a little of the rind of the lemon in the water in which it is dissolved. It is used medicinally, principally in forming the effervescing draught, its solution being added to the solution of carbonate of potash. One ounce of it, dissolved in a pint of water, is said, by Dr. Powell, to be equal in strength to one pint of common lemon juice.

CITRUS AURANTIUM. The Orange. *Succus fructus.* (Page 202.)

THE juice of the orange has a certain degree of sourness, accompanied in the variety named the China Orange, when ripe, with a sweetness: in that named the Seville Orange, with slight bitterness. The former is used as a refrigerant in febrile affections, more grateful, but less powerful than the fruit of the lemon. It is also used as a remedy in scurvy.

TAMARINDUS INDICA. Tamarind. (Page 266.)

THE fruit of the tamarind contains an acid pulp, which is preserved by the addition of a quantity of unrefined sugar, this forming the Tamarinds of the shops. The acid is principally the citric, sixteen ounces of the prepared pulp containing, according to Vauquelin's analysis, an ounce and a half of citric acid, half an ounce of super-tartrate of potash, two drachms of tartaric acid, and half a drachm of malic acid. This pulp forms a grateful refrigerant beverage, a little of it being infused in tepid water, which is often taken in febrile affections.

ACETUM. Vinegar. Acidum Aceticum Dilutum.

VINEGAR is a weak acid, formed by that species of fermentation which succeeds to the vinous fermentation, when the fermented liquor is exposed to the air with a due degree of temperature. During this exposure, its spirituous flavour and pungency, and its intoxicating quality, are lost, and it becomes more or less sour. While this state of fermentation, denominated the Acetous, proceeds, the oxygen of the air is absorbed; according to the experiments of Saussure, carbonic acid is also formed; and the formation of the acid appears therefore to be owing to these changes of composition, in the principles peculiar to the vinous fermented liquor. The product differs according to the kind of fermented liquor from which it has been obtained. In general it is more acid as this has been more spirituous. Vinegar from wine, therefore, is strongest, and its odour too is more grateful. It is obtained of inferior quality from fermented malt liquors, or from a solution of sugar.

Vinegar when fully fermented is limpid, of a yellowish colour, has an odour which is agreeable and somewhat pungent, and a sour taste. The acid existing in it is very largely diluted with water, and there are also present portions of gluten, mucilage and extractive matter, and frequently malic and tartaric acids.

It is freed from these latter substances by distillation; the process for which has a place in the pharmacopœias. The distilled vinegar is colourless, but its odour is less grateful than that of common vinegar. It is however purer, and is not liable to decomposition, or to become mouldy; hence it is preferable for the preparation of medicated vinegars, and for other purposes in pharmacy.

The acid which is the basis of vinegar, can be obtained in a concentrated state by various methods, principally by the decomposition of its saline combinations; and processes of this kind are now received into the pharmacopœias. As obtained from the metallic acetates by heat, it is in particular extremely strong and pungent; and at one time, the acid thus procured was supposed to differ in composition from that obtained by other methods, and was distinguished by the appellation of acetic acid, while the other was named acetous. It has been established, however, that they differ only in the degree of concentration, and the name acetic is applied to the acid in all its states. When concentrated it is highly odorous and pungent, and is used principally as a stimulating perfume.

Common vinegar is sometimes employed as a refrigerant in febrile affections. It is also much celebrated as an antidote to the vegetable narcotics. Externally, it is used as an application to burns and as a discutient. In pharmacy, distilled vinegar is employed as the solvent of the active matter of several vegetable substances.

Offic. Prep.—Acid. Acet. Dist. Acid. Acet. Arom. Acid. Acet. Camph. Syr. Acid. Acet. *Ed.*

SUPER-TARTRAS POTASSÆ. Super-Tartrate of Potash. (Page 279.)

FROM the excess of acid which this salt contains, it possesses the virtues of a refrigerant. A solution of it in a large quantity of water, sweetened with sugar, and receiving flavour from the infusion of a small quantity of the rind of lemon, forms a cooling beverage, used in febrile affections, and recommended, especially in hos-

pital practice, by its cheapness. Its only disadvantage is its being liable to prove purgative.

NITRAS POTASSÆ. Nitrate of Potash. Nitre. (Page 294.)

THIS salt impresses a sense of coolness in the mouth, and when taken in small doses frequently repeated, appears to have the effect of reducing the force of the circulation. It is hence not unfrequently used as a refrigerant in acute inflammatory diseases. It is given in a dose of from 5 to 15 grains repeated every four or five hours. When given in larger doses, it occasions nausea, and pain of the stomach. It is also often used as a refrigerant, under the form of gargle, in the different species of cynanche, one drachm being dissolved in six or eight ounces of water: or the nitre troches are allowed to dissolve slowly in the mouth.

Offic. Prep.—Troch. Nitr. Pot. *Ph. Ed.*

SUB-BORAS SODÆ. Sub-Borate of Soda. Borax.

THIS salt, consisting of boracic acid, united with soda, the soda being slightly in excess, is brought from Thibet, where it is found in a native state. It is purified in Europe by crystallization, and is usually in the form of crystalline masses of no regular figure; its taste is cool; it is soluble in eighteen parts of cold, and six of hot water.

Borax is not used internally in modern practice, nor does it appear to possess any activity. Its solution is in common use as a cooling gargle, aud mixed with an equal part of sugar, it is used in the form of powder to remove the aphthous crust from the tongue in children. Mixed with honey, it forms an officinal preparation in the London Pharmacopœia, applied to the same purpose.

Offic. Prep.—Mel. Boracis. *Ph. Lond.*

CHAPTER XVII.

OF ANTACIDS.

These are remedies which obviate acidity in the stomach, by combining with the acid and neutralizing it. The substances most powerful in exerting this kind of action and which can be employed, are the alkalis, and, among the earths, magnesia and lime. They can be regarded only as palliatives, the production of the acid being to be prevented by the administration of remedies capable of restoring the tone of the stomach. They are employed in dyspepsia, and in diarrhœa arising from acidity.

ANTACIDS.

Potassa.
Soda.
Ammonia.
Calx.
Magnesia.

Potassa. Potash.

This alkali is obtained from the incineration of the woody parts of vegetables. The ashes are lixiviated, and by evaporation the saline matter, consisting chiefly of sub-carbonate of potash, is procured. This forms the potash of commerce; it is purified by a second solution in water and evaporation; and to procure the alkali, lime is added to the solution of this sub-carbonate; the whole is put upon a filtre, so that the alkaline solution may pass slowly through the mass of lime; the carbonic acid is thus more effectually abstracted by the lime, and the

potash passes through in solution, sufficiently pure for any medical application. This solution (Aq. Potassæ) is sometimes employed to relieve the symptoms from acidity, where the generation of acid is constant and abundant, being given in a dose of 15 drops diluted in water. Its acrimony renders it, however an unpleasant remedy. The sub-carbonate, or the neutral carbonate, is likewise occasionally employed in solution. But the most common form under which the alkali is used as an antacid, is the super-carbonate. For the preparation of this a formula is introduced into the Edinburgh Pharmacpœia, an ounce of sub-carbonate of potash being dissolved in ten pounds of water, and this being combined by a moderate degree of pressure, with an excess of carbonic acid. By this impregnation, the acrid alkaline taste is concealed, and an agreeable pungency communicated. The liquor is taken as an antacid, in the dose of half a pound occasionally.

Soda. Soda.

This alkali is obtained in the state of carbonate, from the saline matter, formed in the combustion of marine vegetables, the barilla of commerce. In its pure state it is not employed in medicine; the carbonate or sub-carbonate is used as a lithontriptic, rarely as an antacid; but the super-carbonate is frequently taken. It is prepared in the same manner as the super-carbonate of potash, the proportions being so adjusted that the strength of each solution is nearly the same. It is therefore taken in the same dose, and is usually preferred, as being supposed to be more mild, to the super-carbonate of potash water.

Ammonia. Ammonia.

The solution of ammonia in water (Aq. Ammoniæ) is sometimes used as an antacid, and it has been recommended by Dr. Sims as superior even to the other alkalis in relieving cardialgia, and other symptoms from acidity: so much so, that he has been led to suppose

that these symptoms frequently arise, not merely from the liquid contents of the stomach being acid, but from the elastic fluid with which it is more or less distended having a degree of acidity, on which the ammonia from its volatility more readily acts. From 20 to 30 drops of the solution are given in a cupful of water. The solution of the carbonate of ammonia is also used in a dose of half a drachm; and the aromatic ammoniated alcohol forms a still more grateful antacid and stimulant.

CALX. Lime. (Page 183.)

LIME, under the form of lime water, is occasionally used as an antacid, in a dose of four or six ounces. It operates, not only chemically, neutralizing the acid, but by its astringent and tonic power contributes to restore the tone of the stomach. It is also employed under the form of carbonate of lime, of which there are two varieties in use, Creta Alba, and Lapilli Cancrorum: the former named by the Edinburgh College, Carbonas Calcis Mollior, and the latter, Carbonas Calcis Durior.

CARBONAS CALCIS MOLLIOR. Creta Alba. White Chalk.

THIS is a carbonate of lime, found abundantly in nature, nearly pure, or containing only minute quantities of other earths. From the grosser impurities with which it is mixed, it is freed by levigation and washing. It is then named Prepared Chalk, (Creta Præparata.) This is an anticid in very common use. As the compound it forms with the acid in the stomach has no purgative quality, but appears to be quite inert, it is the antacid commonly employed to check diarrhœa proceeding from acidity. It is given in a dose of one or two drachms, with the addition of a small quantity of any aromatic. The chalk mixture of the Edinburgh Pharmacopœia affords a very good form for administering it.

Offic. Prep.—Pulv. Carb. Calc. Comp. Mist. Carb. Calc. *Ph. Ed. Lond.*—Pulv. Cret. C. et Opio. *Ph. Lond.*—Troch. Carb. Calc. *Ed.*

CARBONAS CALCIS DURIOR. Cancrorum Lapilli et Chelæ. Crabs' Stones, Crabs' Claws. Cancer Astacus. Cancer Pagurus.

In the head and stomach of the river craw-fish, are found certain concretions, consisting principally of carbonate of lime, with a little phosphate of lime and animal gelatin. They are prepared by levigation, and washing with water, and are named Lapilli Cancrorum præparati, formerly Oculi Cancrorum præparati. The tips of the claws of the common sea-crab, are similar in composition, and are prepared in the same manner. They are named Chelæ Cancrorum præparatæ. Both are employed as carbonates of lime, and being prepared with more care, are in general smoother, and more easily diffused in water than the common prepared chalk, though there is reason to believe, that as met with in the shops, they are merely chalk with a little gelatin.

MAGNESIA. Magnesia. (Page 269)

Magnesia is a primary earth, usually obtained in the state of carbonate by decomposing its sulphate or its muriate by an alkaline carbonate, and in its pure state, by expelling from this the carbonic acid by the application of heat. In either state it is used as an antacid: the carbonate has the inconvenience, where large quantities of it require to be taken, of occasioning flatulence from the disengagement of its carbonic acid, and this leads to the preference of the pure magnesia. It is given in a dose of a scruple or half a drachm. The salt which magnesia forms with the acid in the stomach proves slightly purgative; and this is the only reason for distinction in practice between this earth and the carbonate of lime, the one being used where diarrhœa accompanies acidity; the other where a laxative effect is wished to be obtained.

CHAPTER XVIII.

OF LITHONTRIPTICS.

Lithontriptics are medicines supposed to have the power of dissolving urinary calculi: their operation, it is obvious, must be purely chemical.

The alkalis, it has been long known, relieve the painful symptoms arising from these calculi; and it was found by experiment that they are capable of dissolving these concretions out of the body; hence it was concluded, not unjustly, that their efficacy depends on their solvent power.

The discoveries of Modern Chemistry have thrown farther light on this subject: it has been proved that these urinary concretions consist frequently of a peculiar animal acid, the lithic or uric acid, either nearly pure, or sometimes combined with ammonia, and animal matter, apparently albumen. With this acid, the alkalis, in their pure state, are capable of combining, forming a compound soluble in water.

It has been ascertained, that from the internal administration of the fixed alkalis, either potash or soda, the urine becomes impregnated with them, so as to be sensibly alkaline. Experiments too have proved that either of these alkalis may be given to such an extent, as to enable the urine applied to a calculus out of the body to dissolve part of it; and it appears therefore to follow, that the same solvent power will be exerted on a concretion in the bladder or kidney. Unfortunately, however, the use of the alkalis to this extent cannot long be persisted in, from the irritation they occasion in the stomach and the bladder; and we have scarcely, perhaps, any decisive proof of a urinary calculus of any considerable size being actually dissolved. The use of these agents in a moderate quantity, however,

may prevent its increase ; and, as it is often at length covered by matter deposited from the urine, by which its surface is rendered more smooth, this practice frequently alleviates the symptoms.

When the alkalis are used in this manner merely as palliatives, they are generally employed in the form of carbonate, or super-carbonate, as in that state they are more mild and pleasant. Their solvent power is however thus impaired. Still the alkalis in this mild form retain the power of preventing the increase of the urinary concretion. The deposition of uric acid, to which that increase is owing, depends in a great measure on the generation of acidity in the primæ viæ. The acid which is there formed passes off by the kidneys, and causes the precipitation of the uric acid ; the use of the mild alkalis, by correcting this acidity, prevents this deposition, and of course prevents the increase of the urinary concretion, and lessens the irritating quality of the urine. It has accordingly been found, that under a course of alkaline remedies, the disposition of uric acid, so frequently abundant from the urine of those who are liable to calculus, diminishes rapidly.

The administration, then, of these substances is different, according to the object of the practitioner. If he attempt the solution of the calculus, the pure alkali must be given in as large doses, and for as long a time as the patient can bear it : if he seek merely to palliate the symptoms, the continued use of moderate doses of the alkali saturated, or super-saturated with carbonic acid is sufficient, and is even preferable, or less hurtful to the stomach or general system. In both cases, it is proper that diluents should be freely used; and the pure alkali, when employed, ought always to be mixed with some mucilaginous or gelatinous fluid.

These were the views generally given of the operation of lithontriptic medicines, after the discoveries of Scheele and Bergman had made known the properties of uric acid. More recent investigations have still farther extended our knowledge of this subject, and un-

fortunately preclude still more the hope of lithontriptics being employed with advantage as actual solvents.

It had always been known, that urinary calculi are not of uniform appearance and qualities. Dr. Wollaston's researches have proved, that they are of very different chemical constitution, and his experiments have been confirmed by those of Fourcroy and Vauquelin.

Besides the uric acid calculus, which is generally of a brown or yellowish colour, of a compact or radiated structure, smooth on the surface, and perfectly soluble in alkaline solutions, another had been observed, composed principally of a matter frequently disposed in layers, white, of a lamellated structure, soft and smooth to the touch, and giving a light powder of a brilliant whiteness. This calculus is not soluble in alkaline solutions, but dissolves very easily in diluted acids: it melts before the blowpipe into an enamel; the substance composing it is phosphate of magnesia and ammonia, and though it seldom forms an entire calculus in its pure state, it is often intermixed with the other usual ingredients, or disposed with these in alternate layers.

Phosphate of lime forms another variety of calculus, sometimes alone, but more generally mixed with uric acid, or with phosphate of magnesia and ammonia. Calculi of this kind have usually no great induration, feel dry and rough, and without any lamellated or spathose structure; they are not dissolved by the alkalis, but are soluble more or less in diluted acids.

Lastly, a calculus had been known to surgeons, under the name of Mulberry Calculus, derived from its purplish colour, and its rough irregular surface. This is composed principally of oxalate of lime, with portions of uric acid, phosphate of lime, and animal matter. It is harder and heavier than any of the others; and is less affected by the usual solvents, alkaline solutions having no effect upon it, and acids dissolving it with great difficulty; the alkaline carbonates slowly decompose it.

Now, from these diversities, in chemical constitution,

among urinary concretions, it is obvious that we cannot expect uniform advantage from the use of any active solvent as a lithontriptic, since what dissolves one calculus will have no effect upon another ; and cases have accordingly occurred, where, instead of relief being obtained, as it frequently is from the use of alkalis, it was obtained from weak acids. There is also a peculiar source of difficulty, which has been pointed out by Mr. Brande, attending the attempt to exhibit lithontriptics as solvents, which must probably render it impracticable. The phosphates of lime and magnesia, which exist in the urine, are retained in solution principally by its excess of acid : if, therefore, with the view of dissolving a uric acid calculus, or preventing its increase, alkalis be given so as to neutralize this acid, the deposition of these phosphates may be favoured, and a layer of them form on the existing calculus. And there is reason to believe, that the softness and sponginess which have been observed not unfrequently on the surface of calculi, in patients who have continued for a long period the use of alkalis, and which have been regarded as proofs of at least partial solution, have arisen from a deposition of this kind. If, on the other hand, from the state of the urine, or from the information afforded by a small calculus being discharged, there were reason to believe that a calculus in the bladder consisted chiefly of phosphate of ammonia and magnesia, if we attempted the solution of this, by the administration of weak acids, we run the hazard of causing the deposition of uric acid. Nor can we hope, by any alternate use of acids and alkalis, so to adjust them as to obtain to any extent their solvent effects, without these counteracting results.

There is another mode, in which it has been supposed that lithontriptics may exert a solvent power. In all urinary calculi, there exists a quantity of animal matter, supposed to be of the nature of albumen, and which has also been regarded as the cementing ingredient, giving induration to the calculus. On this it has been con-

ceived solvents may act, so as to destroy the cohesion of the aggregate. The experiments of Dr. Egan confirm this, he having found that lime water is more effectual in destroying the cohesion of a urinary calculus, than an alkaline solution,—a result which, on repeating his experiments, I have likewise obtained. Now, this superiority cannot be ascribed to any action of the lime on the saline ingredients of the calculus, but must arise rather from its chemical action on the albumen or animal mucus, of which it is known to be the solvent; and it may therefore be supposed that lime water, from this operation, might be used with advantage as a lithontriptic. It would of course require to be given in combination with alkalis, the latter neutralizing the excess of acid in the urine, which would otherwise combine with lime, and render it inert. But it may be doubted, if this could be managed, so as to obtain any important effect; or that lime could be secreted in its pure form by the kidneys.

From these observations, the advantages to be expected from lithontriptics, it is obvious, must be very limited. They probably cannot be given with greater benefit than simply to correct the excess of acidity in the urine, so frequent in those who labour under calculus, and thus render it less irritating, and prevent the increase in the size of a concretion. Or, it is possible, in cases of the mulberry calculus, which produces much pain from its rough and pointed surface, that pushing the use of them a little farther might prove useful, even by giving rise to the formation of a layer of the phosphate of ammonia and magnesia, which would at least render the surface of the calculus soft and smooth. In their administration, it may be of advantage to attend to the state of the urine, so far as regards its chemical constitution, and to suspend and vary the remedies as this may change. And in all cases the continuance of the remedies, and the length to which they are carried, ought to be regulated principally by the relief from pain which the patient receives.

LITHONTRIPTICS.

Potassa.
Soda.
Sapo Albus.
Calx.

Potassa. Potash. (Page 356)

This alkali is used as a lithontriptic, either pure or combined with carbonic acid. The pure alkali in the state of solution (Aq. Potassæ) has been given in a dose of 15 or 20 drops morning and evening, increasing this gradually as far as the stomach can bear it, until the urine is rendered alkaline; and at the same time diminishing the irritation it is liable to produce, by the free use of diluents, and of any mucilaginous or gelatinous liquid. The action of the pure alkali being more powerful than that of the carbonate or uric acid calculi, it is under this form that it has been employed when the actual solution of the calculus has been attempted. Independent, however, of the difficulties which attend this, from the circumstances pointed out under the general observations on the action of lithontriptics, it is scarcely possible to continue the use of the pure alkali to the requisite extent, from the irritation it occasions both in the stomach and bladder; and when it is to be used as a palliative, it is better to employ it under the form of the super-carbonate.

The super-carbonated potash water, already noticed, (page 356,) affords the most effectual palliative in cases of urinary calculi; the relief obtained from it appears to arise from its neutralizing the free acid in the urine, and thus rendering it less irritable. From half a pound

to a pound is taken in the course of the day: and it has the important advantage, that, from its mildness, it can be continued for any length of time without reluctance.

Soda. Soda. (Page 357.)

Soda, like potash, is used as a lithontriptic, soldom, however, in its pure form. The carbonate, or rather sub-carbonate, is obtained from the barilla of commerce by solution in water and crystallization. The crystals contain half their weight of water of crystallization, and are soluble in two parts of cold, and in an equal part of boiling water. This crystallized salt affords a very excellent form under which it may be administered, so as to give at least the advantages of a palliative, and which is less expensive than any other. It is what has been named the Soda Pill. The crystals are exposed to a very gentle heat, until they lose their water of crystallization, and the dry powder is made into pills with soap. Of these, half a drachm or a drachm are taken in the course of the day.

Soda is likewise employed under the form of the super-cabonated soda water, the powers of which are similar to those of super-carbonated potash water, and which is taken in the same manner.

Sapo albus.—Soap is a form under which the fixed alkalis have been administered in calculous affections. It is a chemical combination of expressed oil with potash, or soda. Potash forms only a soft soap, soda gives one that becomes hard ; and to form the purer soap, it is combined with the mildest vegetable expressed oil. The soap is white, but sometimes is designedly coloured by the addition to it, while soft, of a solution of sulphate of iron.

The acrimony of the alkali is much diminished by its combination with the oil, and on this account soap has been preferred as a lithontriptic, one or two ounces being taken in the course of the day. From the oil it contains, however, it is nauseous, and in such large doses

generally offensive to the stomach, and the super-saturation with carbonic acid affords a much better method of rendering the alkali mild.

CALX. Lime. (Page 183.)

LIME, in the form of lime-water, has been used in calculus, in the quantity of a quart or more daily: it may prove useful by correcting acidity; but in the small quantity in which it can be taken, it can scarcely be supposed that any of it will be secreted by the kidneys, so as to change the composition of the urine. Were it secreted, indeed, it would be rendered insoluble by the free phosporic or uric acids. The only method in which it could be brought to act on a calculus, would be by conjoining its administration with that of the alkalis, so that the urine should be rendered alkaline. This combination constituted the celebrated remedies of Stephens; but even with every precaution it may be doubted if the lime could be made to exert any real lithontriptic power.

BITTERS and astringents have been found of service in calculous cases, evidently by restoring the tone of the stomach, and thus preventing the generation of acid. But they cannot be considered as Lithontriptics.

CHAPTER XIX.

OF ESCHAROTICS.

ESCHAROTICS are substances which erode or dissolve the animal solids. They produce erosion or ulceration, either by directly combining with the animal matter, and forming a soft pulp, or a species of eschar: or they sometimes appear to act by a resulting affinity, causing the elements of the soft solids to enter into new combi-

nations, whence their cohesion is subverted, and their composition changed. In both cases the life of the part is destroyed. They are employed principally to remove excrescences, to establish an ulcer, or to change the surface of an ulcerated part, converting it into a simple sore. The action of all of them is purely chemical.

ESCHAROTICS.

ACIDA MINERALIA.
SUPER-SULPHAS ALUMINÆ ET POTASSÆ.
POTASSA.
NITRAS ARGENTI.
MURIAS ANTIMONII.
SULPHAS CUPRI.
ACETAS CUPRI.
MURIAS HYDRARGYRI.
SUB-NITRAS HYDRARGYRI.
OXIDUM ARSENICI ALBUM.
JUNIPERUS SABINA.

THE MINERAL ACIDS act rapidly as escharotics, especially the sulphuric and nitric acids; but from their fluidity they can seldom be conveniently applied.

SUPER-SULPHAS ALUMINÆ ET POTASSÆ. Alumen. Alum.

ALUM, from its excess of acid, has a degree of escharotic power; and under the form of dried alum, in which its water of crystallization is expelled, is sometimes used in fine powder to check the growth of fungous excrescences from ulcers. This powder, rubbed with a little sugar, is, from the same property, applied to remove opaque specks from the cornea.

POTASSA. Potash. (Page 365.)

PURE potash, in its solid state, forms a powerful escharotic, which has long been in use under the name

of Causticum Commune Acerrimum. When its solution, before being evaporated entirely to dryness, is mixed with a portion of lime, its operation is rendered rather weaker: this preparation is named Causticum Commune Mitius. Either of them is made into a paste with soap, and applied to the part. This application is frequently employed to establish an ulcer, and sometimes in preference to incision to open a tumor; it is attended with a considerable degree of pain, and a sense of burning heat; after it is removed, a cataplasm is applied, by which this is relieved, and suppuration established. Mr. Simmons has recommended potash in preference to other escharotics, to prevent the effects from the bite of a rabbid animal; it is applied freely to the bitten part and the preventive operation of excision, he has supposed, may be rendered more certain by touching the surface with potash.

NITRAS ARGENTI. Nitrate of Silver. Causticum Lunare. Lunar Caustic.

THIS preparation is obtained by dissolving silver in nitric acid, evaporating the solution to dryness, melting the mass by a gentle heat, and while liquid running it into cylindrical moulds, in which, as it cools, it becomes concrete. It is the caustic which is in most common use for checking the growth of fungous excrescences, or changing the diseased surface of an ulcer, a little of it being dissolved in as small a portion of water as is sufficient, and applied by a pencil to the part.

MURIAS ANTIMONII. Muriate of Antimony. (Page 251.)

THIS preparation of antimony has been used as an escharotic, but being liquid it is not easily confined to the part on which it is designed to act, and it has no particular advantage to recommend it.

SULPHAS CUPRI. Sulphate of Copper. Vitriolum Cœruleum. Blue Vitriol.

THIS salt is a mild escharotic, and from this mildness of its operation is adapted to particular cases. Its solu-

tion in water is sometimes employed to change the diseased surface of sores, especially of venereal sores, and either in solution, or in powder mixed with any mild vegetable powder, it is applied to remove specks on the cornea.

Sub-acetas cupri. Sub-acetate of Copper. Ærugo Æris. Verdigris.

This preparation is formed by stratifying plates of copper with the husks of the grape. These suffer a slow fermentation, whence vinegar is formed; and this acting on the copper, forms a green oxide, with which a portion of the acid likewise combines, so as to form a sub-acetate. It is in frequent use as an escharotic, principally to change the surface of foul ulcers, being applied under the form of ointment mixed with lard. In the same form, it is applied as a stimulant in some kinds of ophthalmia.

Offic. Prep.—Ungt. Sub-acet. Cupr. *Ph. Ed. Dub.* —Oxymel Æruginis. *Dub. Lond.*

Murias hydrargyri corrosivus. Corrosive Muriate of Mercury.

This preparation of mercury is occasionally employed as an escharotic. Its solution in water, in the proportion of one grain to the ounce, is in particular applied to venereal ulcers. And still more dilute, it is sometimes used as a lotion to herpetic eruptions.

Sub-nitras hydrargyri. Sub-nitrate of Mercury.

This is in common use as an escharotic, and as a stimulant application to foul and languid ulcers. Reduced to fine powder, it is sprinkled on the part, or it is applied mixed with lard in the form of ointment; for the preparation of which, a formula is given in the Pharmacopœias.

Offic. Prep.—Ung. Sub-nitr. Hydrargyr. *Ph. Dub. Lond. Ed.*

OXIDUM ARSENICI ALBUM. Oxide of Arsenic. (Page 180.)

WHITE oxide of arsenic has been frequently employed as an external application to cancer, and though it has been regarded as in some measure specific, its immediate action is that of an escharotic. It was first introduced as an empirical remedy, and was applied, mixed with several vegetable powders, and made into a paste with the yolk of an egg: this, in a few hours, formed an eschar, by which the diseased surface was changed; and by exciting suppuration by the application of cataplasms, this was thrown off. It has since been used under the form of ointment or solution. The latter has been supposed the least painful form, though perhaps it is not the most effectual. Ten grains are dissolved in one ounce of water, and this solution is applied by a pencil to the sore. It not unfrequently amends the discharge, causes the sore to contract in size, and cases have even been related of its having effected a cure. Violent lancinating pain is someties produced by its application; and in some cases, from its continuance, the general system appears to be affected; a symptomatic cough being induced, which cannot be relieved but by suspending the application, and when this does come on, the use of the arsenic ought to be stopt. It requires, therefore, to be used with caution.

JUNIPERUS SABINA. Savine. (See p. 287.)

THE leaves of savine possess an acrid power whence they are employed as escharotic. The powder sprinkled on warts or excrescenses removes them; or made into an ointment with lard, is used as an application to old ulcers, and to some obstinate cutaneous affections; it has also been recommended as superior to any other stimulating application in exciting that degree of suppuration, necessary to keep up a discharge from an issue.

Offic. Prep.—Cerat. Sabinæ, *Ph. Lond. Dub.*—Ol. Sabinæ, *Ph. Ed. Dub.*

FOURTH DIVISION.

OF MECHANICAL REMEDIES.

THE last subdivision of the classification includes those classes of remedies, the operation of which is merely mechanical. Under this I have placed Anthelmintics, Demulcents, Diluents, and Emollients. They are classes of comparatively little importance.

CHAPTER XX.

OF ANTHELMINTICS.

Anthelmintics are remedies which expel worms from the intestinal canal. They have been supposed to produce this effect by various modes of operation, principally, however, mechanical.

Some, which are in coarse rough particles, as iron or tin-filings, or consist of sharpe spiculæ, as the down of the dolichos pruriens, are supposed, by the mechanical action of these, to dislodge from the mucus of the intestines the worms which are evacuated.

Other substances ranked as anthelmintics seem to have no other property than bitterness. By this quality they have been supposed to prove noxious to these animals: it has also been imagined, that these, so far as they prove useful, do so by restoring the tone of the digestive organs; the production of worms being supposed to proceed from debility of these organs, in consequence of which, either the food is not precisely as-

similated, or the secreted fluids poured into the intestines are not properly prepared.

Lastly, other remedies of this class apparently operate by their cathartic power. Those cathartics which discharge the mucus of the intestines, as gamboge, scammony, or calomel, are supposed more peculiarly to have this effect; and perhaps it is this sub-division of anthelmintics that have most efficacy. Some anthelmintics, it is observed by Dr. Hamilton, "have been considered as specific poison to the insect, and others are conceived to destroy it by mechanical triture. Most of them have had their partisans for the day, and have passed in succession through the ordeal of experience into oblivion. The utility of such anthelmintics as have been found to be most beneficial, has, in my opinion, been in proportion to the purgative powers which they possessed."

After a course of those anthelmintics, which are not directly cathartic, it is usual to give a full dose of a purgative, which is even repeated two or three times, and to this a considerable share of the effect, when worms are evacuated, is probably to be ascribed. Calomel, with jalap, gamboge, or scammony, is the cathartic usually employed.

ANTHELMINTICS.

Dolichos pruriens.
Ferri limatura.
Stannum pulveratum.
Olea europæa.
Artemisia santonica.
Spigelia marilandica.
Polypodium filix mas.
Tanacetum vulgare.
Geoffræa inermis.
Gambogia gutta.
Sub-murias hydrargyri mitis.

Dolichos pruriens. Cowhage. *Diadelph. Decand. Papilionaceæ. Pubes leguminis rigida. East and West Indies.*

The down which covers the outer surface of the pods of this plant, consists of very sharp spiculæ, and is the part used as an anthelmintic. It is made into an electuary, with syrup or molasses, of which two tea-spoonfuls are given to an adult, and repeated two or three times, a strong cathartic being afterwards exhibited. Its action is entirely mechanical. In the West India Islands it is the common anthelmintic, and is described as being frequently successful. In this country it is more rarely used.

Ferrum. Iron.

The filings of this metal have been given as an anthelmintic, in a dose of one or two drachms; and the sub-carbonate, or rust of iron, was highly recommended by Rush as a remedy against the tape worm, when taken to the extent of three or four drachms.

STANNUM. Tin.

Tin is reduced to a powder, consisting of small rounded particles, by heating it nearly to its melting point, and agitating it briskly. Either this powder, or what has been recommended in preference, the metal, in filings, is used as an anthelmintic, in a dose of one or two drachms, or even in a much larger quantity. It is taken repeatedly in the morning, and a cathartic is afterwards exhibited. Its effects, so far as it operates, has been supposed to be mechanical, dislodging the worm from the mucus of the intestines by the grittiness of its particles. It is not improbable, too, that it may act by generating hydrogen gas in the intestinal canal, which proves noxious to the animal; and its efficacy has been said to be increased by combination with sulphur, by which sulphuretted hydrogen gas will be evolved.

OLEA EUROPÆA. Olive Oil. Oleum Olivarum. *Diand. Monogyn. Sepiariæ. Oleum expressum. South of Europe.*

OLIVE Oil, or any other expressed oil, taken in the morning to the extent of half a pound, or as much as the stomach can bear, has been said to prove anthelmintic, but in the state of diffusion and mixture in which it must act on worms in the intestines, it can scarcely be expected to have any certain power.

ARTEMISIA SANTONICA. Wormseed. *Syngen. Polygam. superfl. Compositæ. Semen. Persia.*

THE seeds of this plant have a faint disagreeable smell, and a very bitter taste. They are in common use as an anthelmintic, and probably operate merely as a bitter; the dose is half a drachm, or a drachm of the powder to an adult. This, after being continued for some time, is followed by a dose of a strong cathartic.

Spigelia marilandica. Indian Pink. *Pentand. Monogyn. Stellatæ. Radix. North America.*

The root and stalks of this plant are used in medicine, on the supposition of their anthelmintic power; they have a bitter taste; in a large dose prove purgative, and also sometimes narcotic. They are usually administered in the form of the watery infusion; in the quantity of half a drachm, or even to the extent of two or three drachms to an adult. Its operation as a narcotic has been said sometimes to be produced; and to prevent this, it has been recommended to be given rather in large than in small doses, as its cathartic operation, by which its narcotic power is obviated, is thus obtained. In its dried state, however, in which it is employed in this country, no unpleasant symptom follows from its administration.

Polypodium filix mas. Male Fern. *Cryptogamia. Filices. Radix. Indigenous.*

The root of this plant was once highly celebrated as a remedy against the tape worm; two or three drachms of the powder of it being taken in the morning, and a strong cathartic of jalap or gamboge given soon after it. The efficacy of the prescription probably depended entirely on the cathartic.

Tanacetum vulgare. Tansy. *Syngen. Polyg. superf. Compositæ: Folia et flores. Indigenous.*

The leaves and flowers of this plant have a strong bitter taste, with some aromatic quality, which resides in an essential oil. They have been recommended as anthelmintic, and especially as capable of expelling the lumbrici, and are sometimes used as a popular remedy. The dose, in powder, is from one scruple to one drachm.

Geoffræa inermis. Cabbage-Bark tree. *Diadelph. Decand. Papilionac. Cortex. Jamaica.*

The bark of this tree has an unpleasant smell, with a sweetish taste. It is used as an anthelmintic, and has been considered as one of considerable power, especially in

expelling the lumbrici. It is usually given under the form of decoction, an ounce being boiled in two pounds of water, to one pound, and from one to two ounces of this being given as a dose to an adult. It usually operates as a cathartic, and in an over dose is liable to occasion sickness and vomiting. The same symptoms are said to be induced by the incautious drinking of cold water during its operation. When they occur from either cause, they are relieved by a dose of castor oil.

Offic. Prep.—Decoct. Geoffr. Inerm. *Ed.*

CAMBOGIA. Gamboge. (Page 276.)

GAMBOGE has been celebrated as a remedy against the tape-worm, and by its powerful cathartic operation is sometimes successful in expelling it. It is given in a dose from 5 to 20 grains by itself, or combined with two parts of acidulous tartrate of potash. It is frequently also given as a cathartic after other anthelmintics.

MURIAS HYDRARGYRI MITIS. Mild Muriate of Mercury. Calomel.

SEVERAL of the preparations of mercury have been employed as anthelmintics. Calomel is entitled to the preference, not only from its direct action as a mercurial, but also on account of its action on the intestinal canal. It is given by itself, in a dose of 10 or 12 grains to an adult, or in smaller quantity, combined with jalap or rhubarb. It is also generally the basis of the cathartic usually administered after other anthelmintics have been continued for some time.

CHAPTER XXI.

OF DEMULCENTS.

Demulcents are defined, "Medicines suited to obviate and prevent the action of acrid and stimulant matters; and that, not by correcting or changing their acrimony, but by involving it in a mild and viscid matter, which prevents it from acting upon the sensible parts of the body," or by covering the surface to which they may be applied. Their action has been supposed to be exemplified in catarrh, where the irritation at the top of the trachea, occasioning coughing, is removed by mucilaginous substances; or in gonorrhœa, where the sense of heat and pain from the application of the stimulus of urine to the inflamed surface of the urethra is prevented by similar means.

Where these substances are directly applied to the part, it may be understood how this operation is obtained from them. But where they are received by the medium of the stomach into the circulating system, it has been supposed that they can have no such effect. They must be changed by the process of digestion, and lose that viscidity by which only they operate, so that they cannot afterwards be separated by any secretion in their original form. Hence their utility in gonorrhœa and similar affections has been altogether denied.

It is not clear, however, that such a conclusion is just. It is sufficiently certain, that many substances, which undergo the process of digestion, are afterwards separated in their entire state from the blood, by particular secreting organs. There is no gland which has this power more particularly than the kidneys; substances received into the stomach and digested, afterwards passing off in the urine with all their peculiar properties. Saccharine matter for example, there is reason to believe, can be separated in this manner; and it is equally probable, that mucilaginous or oily substances, which form

the principal demulcents, are capable of such a separation. There can be no doubt, however, but that a great share of the relief demulcents afford in irritation, or inflammation of the urinary passages, is owing to the large quantity of water in which they are diffused, by which the urine is diluted, and rendered less stimulating. Perhaps the relief is to be ascribed solely to this dilution: since no alteration is perceived in the quality of the urine, from the use of these substances. And, in general, we may consider demulcents as being merely substances less stimulating than the fluids usually applied to the parts.

The diseases in which demulcents are used, are principally catarrh, diarrhœa, dysentery, calculus, and gonorrhœa. They are evidently not medicines of any great power; they are only calculated to alleviate symptoms, and may be freely used in as large quantities as the stomach will receive them.

Demulcents may be arranged under the two divisions of Mucilages, and Expressed Oils.

DEMULCENTS.

Mimosa nilotica.
Astragalus tragacantha.
Linum usitatissimum.
Althæa officinalis.
Malva sylvestris.
Glycyrrhiza glabra.
Smilax sarsaparilla.
Cycas circinalis.
Orchis mascula.
Maranta arundinacea.
Triticum hybernum.
Lichen icelandicus.
Cornu cervi.
Ichthyocolla.
Amygdalus communis.
Olea europæa.
Sevum ceti.
Cera.

ARABICUM GUMMI. Gum Arabic. Mimosa Nilotica. *Polygam. Monæc. Lomentaceæ. Africa.*

GUM is a proximate vegetable principle, which is obtained by exudation, more or less pure, from a number of plants. The gum Arabic of commerce is not exclusively the produce of one vegetable; that which is most pure, and used to be imported from Egypt, is from a species of mimosa. The London College admit, on the authority of Wildenow, a different genus, Acacia, as substituted for that of Mimosa; they refer to the species producing this gum by the name Acacia Vera, and name the gum itself Gummi Acaciæ, while the Edinburgh College name it Gummi Mimosæ Niloticæ. The purest gum of the shops is in small irregular pieces, white or yellowish, semi-pellucid, without taste or smell: there are other varieties coarser, of a yellow or red colour. All of them have the properties of gum; are insoluble in alcohols or oils, and soluble in water, forming a viscid solution named Mucilage.

Gum Arabic is in common use as a demulcent. In catarrh it is allowed to dissolve slowly in the mouth, and its mucilage is the basis of the mixtures usually employed to allay coughing. Sometimes, too, it is employed in tenesmus, strangury, and *ardor urinæ.* In Pharmacy, mucilage of gum Arabic is employed for a variety of purposes. It serves to suspend heavy powders in waters; to diffuse oils, balsams, and resins in water, and give tenacity to substances made into pills.

Offic. Prep.—Emuls. Gummi Mimosœ Nil. *Ph. Ed. Dub.*—Muc. Gum. Mim. Nil. *Ed. Lond. Dub.*—Troch. Gum. *Ed.*

ASTRAGALUS TRAGACANTHA. Tragacanth. *Diadelph. Decand. Papilionaceæ. Gummi. South of Europe, Asia.*

TRAGACANTH is obtained by exudation; the plant producing it, a native of Persia, is said to differ from the Astragalus Tragacantha of Linnæus; it is described by Olivier as a distinct species, under the name of Astra-

galus Verus; and this is admitted by the London College. Tragacanth is in small wrinkled pieces, semi-transparent and brittle, and has neither taste nor smell. It is regarded as a gum, yet it differs from the other pure gums in not being perfectly soluble in cold water: it is softened and diffused, but remains flocculent and turbid. When heat is applied, it communicates to the water a great degree of viscidity, but still the solution remains turbid. It is greatly superior to all the gums, in giving viscidity to water; its power in this respect being to that of gum Arabic as 1 to 24.

Tragacanth has virtues similar to gum Arabic. It is less employed, except in some pharmaceutical processes, in which, from its greater viscidity, it is preferred, as in making of troches.

Offic. Prep.—Mucil. Astrag. Trag. *Pharm. Ed. Dub.*—Pulv. Trag. C. *Lond.*

LINUM USITATISSIMUM. Flax. *Pentand. Pentagyn. Gruinales. Semen. Indigenous.*

THE seeds of this plant afford a strong mucilage by infusion or decoction in water, which has no unpleasant taste or smell. These preparations of it are, therefore, frequently used as demulcents in catarrh and gonorrhœa, in a dilute state, being rendered more grateful by the addition of a little sugar and lemon juice.

Offic. Prep.—Infus. Lini. *Ph. Lond.*

ALTHÆA OFFICINALIS. Althæa. Marsh-mallow. *Monadelph. Polyand. Columniferæ. Radix. Indigenous.*

ALL the parts of this plant yield a mucilage by infusion or decoction in water: the root does so most abundantly, and freed from its outer bark, is kept in the shops. Its mucilage is similar to that from lintseed, and is used for the same purposes. It is even preferable, as being more pure.

Offic. Prep.—Decoct. Alth. Off. *Ph. Ed.*—Syr. Alth. Off. *Ed. Lond.*

MALVA SYLVESTRIS. Common Mallow. *Monadelph. Polyand. Columniferæ. Folia. Indig.*

THE leaves of this plant afford a mucilage by infusion in water, weaker, however, than that from lintseed or althæa. The plant is therefore little used, and might be discarded.

Offic. Prep.—Decoct. Malv. Comp. *Ph. Lond.*

GLYCYRRHIZA GLABRA. Liquorice. *Diadelph. Decand. Papilionac. Radix. South of Europe.*

THE root of this plant has a sweet agreeable taste, with no flavour. This sweetness is extracted by water by influsion or decoction; and by evaporation a dark coloured extract of the same sweet taste is obtained, consisting principally of saccharine and mucilaginous matter. Alcohol likewise extracts the sweetness of liquorice, with less of the mucilage.

Liquorice-root is employed as a demulcent, and on account of its sweet taste is frequently added to infusions of lintseed, or althæa. Its watery extract is also in common use as a demulcent in catarrh, being allowed to dissolve slowly in the mouth.

Offic. Prep.—Extr. Glycyrrh. Gl. *Ph. Ed. Dub.*—Troch. Glycyrrh. Troch. Glycyrrh. cum Opio, *Ed.*

SMILAX SARSAPARILLA. Sarsaparilla. *Diœcia. Hexand. Sarmentaceæ. Radix. South America.*

THIS root is in long slender twigs, internally white, and covered with a brownish bark: it has scarcely any smell; its taste is mucilaginous, and slightly bitter. Water extracts its bitterness; by beating it with water, a portion of fecula is separated, white and insipid, in which the virtues of the root appear to reside. For pharmaceutic preparation it is split and cut into small pieces.

Sarsaparilla produces no sensible effect on the system, and it can scarcely be regarded except as a demulcent, when given under its usual form of decoction. It has

however, been considered as a specific in the treatment of some venereal affections, particularly those of the bones or periosteum, and as a restorative in that state of debility which is the consequence of the disease protracted, or of the mercurial irritation. It has also been recommended in extensive ulceration, in cutaneous affections, and in chronic rheumatism. It is given in the form of decoction, and is very frequently joined with guaiac and mezereon, the pungency of which at least it covers.

Offic. Prep.—Dec. Smil. Sarsap. *Ph. Ed. Lond. Dub.* —Dec. Sarsap. Comp. *Lond. Dub.*—Extr. Sarsaparill. *Lond.*

CYCAS CIRCINALIS. Sago. *Cryptogamia. Filices. East Indies.*

SAGO is a fecula obtained from the pith or medullary part of the branches of the plant, by maceration in water. It is in small grains of a brownish colour, without taste or smell. Boiled in milk or water, it dissolves entirely; and this with sugar, and the addition frequently of a little wine, forms a nutritious jelly, prescribed in diarrhœa as a demulcent, and in convalescence as a nutritious article of diet, easy of digestion.

ORCHIS MASCULA. Salop. *Gynand. Diand. Orchideæ. Indigenous.*

THE root of this plant, by maceration in water and beating, affords the fecula known by the name of Salop. Its qualities and virtues are similar to those of Sago.

MARANTA ARUNDINACEA. *Monand. Monogyn. Scitamineæ. South America.*

THE fecula which has been lately introduced under the name of Arrow-Root Powder, has been said to be the produce of this plant, though there is now generally substituted for it the fecula of some indigenous plants. It is used as a demulcent in diarrhœa and dysentery, and as a nutritious article of diet for convalescents. It forms a jelly by boiling with water or milk, and it is under this form that it is taken.

TRITICUM HYBERNUM. Wheat. *Triand. Digyn. Gramina. Fecula seminum. Amylum.*

STARCH, the fecula of wheat, obtained by beating the grains previously soaked in water, forms a gelatinous solution when boiled with water, which is used as a demulcent. It is sometimes given as an enema in tenesmus, and is the common vehicle for giving opium under that form.

Offic. Prep.—Mucilag. Amyli. *Ph. Ed. Lond. Dub.*

LICHEN ICELANDICUS. Iceland Liverwort. *Cryptogamia. Algæ. Iceland.*

THE different lichens contain a kind of mucilaginous matter or fecula, which is extracted by boiling in water. The lichen icelandicus consists principally of this kind of matter, with a portion of extractive principle having a degree of bitterness. This bitterness is removed by maceration in cold water, and then by decoction with water a gelatinous solution is obtained. This is used as an article of diet in the countries of which this lichen is a native; and it has been introduced into medical practice as a demulcent, and a nutritious substance easy of digestion. The decoction has received a place in the London Pharmacopœia.

Offic. Prep.—Decoct. Lichenis. *Ph. Lond. Dub.*

CORNU CERVI RASURA. Hartshorn Shavings. Cervus Elaphus. Cornu. *Mammalia. Pecora.*

BONE, and horn which is of similar composition, contain a considerable quantity of gelatin, along with phosphate of lime. The horns of the deer have been supposed to afford this in the purest state, and they have therefore been received into the Materia Medica. They are freed from their outer rough covering, and the internal white part is rasped down for use. The shavings, afford, by decoction in water, a jelly, which, rendered grateful by sugar and a little wine, is used in diarrhœa and dysentery as a demulcent, and in convalescence as a light nutritious article of diet.

Ichthyocolla. Isinglass. Acipenser Sturio. *Pisces. Chondropterygii.*

Isinglass is obtained from the skin and other parts of the sturgeon, as well as several other kinds of fish caught in the northern seas. The internal skin is boiled in water; the strained decoction is inspissated; and the solid mass formed into convoluted pieces is the isinglass of the shops. It is nearly pure gelatin, is almost entirely soluble in water by boiling, forming a gelatinous solution, which has sometimes been employed as a demulcent.

Amygdalus communis. *Icosandria. Monog. Pomaceæ. Fructus; Nucleus; Ol. Express. South of Europe.*

The kernel of the fruit of the almond is farinaceous with a portion of expressed oil. The oil is obtained by expression from the seeds, or by decoction of them in water. It is very similar to the olive oil, but purer, and more free from any rancidity. In common with expressed oils, it has the properties of a demulcent; and diffused in water by the medium of mucilage, or a few drops of an alkaline solution, it is given in catarrh.

There is another mode in which this oil is given as a demulcent, more grateful, that of emulsion. The almonds are triturated with water; the oil is diffused in the water by the medium of the mucilage and fecula of the almond, and a milky-like liquor is formed, which is used as a pleasant demulcent and diluent, particularly to obviate strangury from the application of a blister.

Offic. Prep.—Emuls. Amygd. *Ph. Ed. Lond. Dub.*—Confect. Amygd. *Ph. Lond.*

Olea europæa. Olive Oil. (Page 375.)

The oil obtained from the fruit of the olive by expression, is of a light yellowish or greenish colour, without either taste or smell. It is the expressed oil which is most commonly used in medicine. It is employed as a demulcent in catarrh, and some other affections, dif-

fused in water by the medium of mucilage, or by a very small quantity of one of the alkalis, and is thus taken in as large quantities as the stomach can bear; it may be doubted, however, whether with any advantage. Its application as an anthelmintic has been already noticed. Externally it is used as an emollient.

Sevum ceti. Spermaceti. Physeter Macrocephalus. *Mammalia. Cetacea.*

This fatty matter is obtained from the head of the particular species of whale above stated. The cavity of the head contains a large quantity of an oily fluid, from which, on standing, a concrete substance separates. This, freed from the oil by expression, and purified by melting and boiling with a weak alkaline solution, is the common spermaceti. It is in white flakes, unctuous and friable, and has neither taste nor smell. Its chemical properties are the same as those of the expressed oils and fats, except that it does not easily unite with the alkalis, and that it is soluble to a certain extent in alcohol and ether. Its medicinal virtues are those of a mild demulcent, and as such it is given in catarrh and gonorrhœa, mixed with sugar, or sometimes diffused in water by the medium of the yolk of an egg. It enters as an unctuous substance into the composition of ointments.

Offic. Prep.—Cerat. Cetacei, Unguent. Cetaceæ, *Ph. Lond.*

Cera. Wax.—This is a concrete substance of a particular nature, supposed to be collected from the antheræ of vegetables by the bee. The experiments of Huber appear to have proved, that it can be formed by this insect from changes produced on it by its saccharine food. Still it is to be regarded as a vegetable product. It exists in the fruit and flowers of many plants, and some, as the Myrica Cerifera, afford a substance perfectly analogous in large quantity. Wax, in its chemical properties, resembles most nearly the expressed oils, differing from them principally in solidity, and

in combining less readily with the alkalis. It is of a yellow colour, but by bleaching can be rendered white.

Wax has been used as a demulcent in dysentery, being diffused in water by means of mucilage of gum Arabic, but it has no particular quality to recommend it. It is used in the composition of ointments and plasters, communicating to them consistence and tenacity.

Offic. Prep.—Emp. Ceræ, *Ph. Ed. Lond.*

CHAPTER XXII.

OF DILUENTS.

Diluents have been defined, Substances which increase the fluidity of the blood, by augmenting the proportion of fluid in it. Watery liquors, it is obvious, will have this operation to a certain extent, and, strictly speaking, water can be regarded as the only proper diluent. But different mild substances are added to it to render it pleasant, and frequently to communicate to it a demulcent quality, diluents and demulcents being generally employed to answer the same indications.

Diluents are prescribed principally in acute inflammatory diseases, with the views of quenching thirst, and diminishing the stimulating quality of the blood. They are employed too to favour the operation of sweating, being given tepid; and sometimes to promote the action of diuretics, especially of those which are saline. And there are some chronic diseases in which diluents appear advantageous. Some mineral waters, celebrated for their efficacy, are found to be nothing but water uncommonly pure, such as the Malvern Water; and the advantage derived from these in scrofulous affections is probably to be attributed to mere dilution.

CHAPTER XXIII.

OF EMOLLIENTS.

The class of Emollients, according to the definition given by Cullen, includes those medicines which diminish the force of cohesion in the particles of the solid matter of the human body, and thereby render them more lax and flexible. Their operation is evidently mechanical; they are insinuated into the matter of the solid fibre, and either diminish its density, or lessen the friction between its particles. Hence they are useful where the fibres are rigid, or where they are preternaturally extended, and therefore afford relief when topically applied to inflamed parts, to tumours distending the skin, or where the skin is dry and rigid. There may be included under the same class, those substances which, applied to the surface, by their smoothness and bland quality afford relief from any irritation.

Heat, conjoined with moisture, is the principal emollient. Warm water is of itself useful; but when applied, by the medium of some vegetable substances, as in the different fomentations and cataplasms, it is more advantageous as the heat is longer retained, and as it can be more conveniently applied. The emollient power is little increased by such additions, though some have supposed that the mucilaginous vegetables have some efficacy of this kind.

The other emollients are the oils or unctuous substances: they are merely introduced by friction; and in distention of the animal fibre, as, for example, in dropsical swelling, they afford some relief. Any of the expressed oils or lard may be used for this purpose. Axungia Porcina, Hog's Lard, is the only substance of this kind not hitherto noticed. It is the fat of the hog, freed from the membranous threads or cellular fibre with which it is intermingled. This is done by melting it, with the

addition of a little water to prevent the heat from rising too high: it collects on the surface of the water, and when cold, becomes concrete. It forms the common basis of ointments, which are applied as a dressing to inflamed parts. Such compositions too are formed from any of the expressed oils, melted with a due proportion of spermaceti, or wax: they prove useful in a great measure by excluding the air, while, from their smoothness and softness, they excite no irritation. The thick and bland liquid formed by the combination of lime water, with expressed oils, (Linimentum Aquæ Calcis,) is another emollient composition, usually employed as a soothing application to burns, and proving useful by a similar operation.

APPENDIX

TO

VOLUME FIRST.

IN concluding the history of the articles of the Materia Medica; I have thought it proper to present a view of that arrangement in which they are associated, according to their natural characters. In classing these substances on this principle, they have usually been comprised under the three leading divisions, of Mineral, Vegetable, and Animal substances. The first of these divisions, however, is either not sufficiently comprehensive, or too great an extension must be given to the signification of the term applied to the class, so as to bring under it substances which cannot be referred to either of the others, and which, at the same time, cannot be regarded as belonging to what is strictly denominated the Mineral Kingdom.

A more correct division, therefore, is, into the two great Classes of Unorganized Substances, and of Substances which are the products of Organization, the latter comprising the vegetable and animal products, while the former may include all the other articles of the Materia Medica. The substances belonging to the first, may be subdivided according to their chemical relations ; those belonging to the second, according to their natural affinities. Thus, under the one will be placed the orders of Salts, Earths, Inflammables, Metals, Waters, and Airs. Under the other, both Vegetable and Animal Substances may be arranged according to the usual classes of the Linnæan System. With regard to vegetables, some have indeed preferred asso-

ciating them as they belong to the natural families or orders of plants; for as in these the arrangement is founded not on arbitrary characters, but on similarity of structure and organization, those substances, it has been imagined, will be brought together, which are possessed of similar powers. But this system of natural classification is still so defective, that this has been hitherto very imperfectly attained, and, under the same order, plants of the most discordant qualities are placed. There is therefore no advantage in departing from the more usual arrangement.

There are some substances, such as the vegetable acids, which may be placed under either general division. They are strictly products of operations depending on organization: they can also, however, be formed by artificial processes; and from their chemical constitution, I have not hesitated to associate them with the substances to which they appear to have the most strict relation.

TABULA MATERIÆ MEDICÆ.

I. INORGANICA.

CLASSIS I.—SALES.

ORDO—ACIDA.

Acidum sulphuricum.
nitrosum.
nitricum.
muriaticum.
oxy-muriaticum.
phosphoricum.
carbonicum.
aceticum.
tartaricum.
citricum.
benzoicum.

ORD.—ALKALIA.

Potassa.
Soda.
Ammonia.

ORD.—SALES NEUTRI.

Sulphas potassæ.
Sulphas sodæ.
Nitras potassæ.
Murias sodæ.
Murias ammoniæ.
Oxy-murias potassæ.
Phosphas sodæ.
Carbonas potassæ.
Sub-carbonas potassæ.
Super-carbonas potassæ.
Carbonas sodæ.
Sub-carbonas sodæ.
Super-carbonas sodæ.
Carbonas ammoniæ.
Sub-carbonas ammoniæ.
Sub-boras sodæ.
Acetas potassæ.
Acetas ammoniæ.
Super-tartras potassæ.
Tartras potassæ.
Tartras potassæ et sodæ.
Citras potassæ.
Citras ammoniæ.

CL. II.—TERRÆ.

Calx.
Carbonas calcis.
Murias calcis.
Phosphas calcis.

Baryta.
Murias barytæ.

Magnesia.
Carbonas magnesiæ.
Sulphas magnesiæ.

Murias magnesiæ.

Argilla.
Super-sulphas argillæ et potassæ.

Cl. III.—INFLAMMABILIA.

Sulphur.
Sulphuretum potassæ.
Hydro-sulphuretum ammoniæ.

Phosphorus.

Carbo.

Petroleum.

Alcohol.
Ether sulphuricus.
Ether nitricus.

Cl. IV.—METALLA.

Argentum.
Nitras Argenti.

Hydrargyrum.
Oxidum hydrargyri per triturationem.
Oxidum hydrargyri cinereum.
Oxidum hydrargyri rubrum.
Sub-sulphas hydrargyri flavus.
Nitras hydrargyri.
Sub-nitras hydrargyri ruber.
Murias hydrargyri corrosivus.
Murias hydrargyri mitis.
Murias hydrargyri et ammoniæ.
Acetas hydrargyri.
Phosphas hydrargyri.
Sulphuretum hydrargyri nigrum.
Sulphuretum hydrargyri rubrum.

Ferrum.
Oxidum ferri nigrum.
Oxidum ferri rubrum.
Sulphas ferri.
Murias ferri.
Murias ferri et ammoniæ.
Carbonas ferri.
Acetas ferri.
Tartras ferri et potassæ.
Carbonas ferri et potassæ.

Cuprum.
Sulphas cupri.
Sub-acetas cupri.
Ammoniuretum cupri.

Plumbum.
Oxidum plumbi semi-vitreum.
Sub-acetas plumbi.
Acetas plumbi.
Super-acetas plumbi.

Stannum.

Zincum.
Oxidum zinci.
Carbonas zinci.
Sulphas zinci.
Acetas zinci.

Bismuthum.

Antimonium.
Sulphuretum antimonii.
Oxidum antimonii sulphuretum.
Oxidum antimonii hydro-sulphuretum.
Oxidum antimonii vitrificatum.
Oxidum antimonii album.
Oxidum antimonii cum phosphate calcis.
Murias antimonii.
Tartras antimonii et potassæ.

Arsenicum.
Oxidum arsenici album.
Arsenias potassæ.

Cl. V.—AQUÆ.

Aqua pura.

Aquæ minerales.

Aquæ minerales carbonatæ.
salinæ.
sulphureæ.
ferrugineæ.

Aqua marina.

Cl. VI.—GASEA.

ORD.—GASEA EXCITANTIA.

Gas oxygenium.

Gas oxidum nitrosum.

ORD.—GASEA SEDANTIA.

Gas nitrogenium.
Gas hydrogenium.
Gas acidum carbonicum.
Gas hydrogenium carburetum.

ELECTRICITAS.

GALVANISMUS.

II. ORGANICA.

VEGETABILIA.*

CLASSIS—MONANDRIA.

ORD.—MONOGYNIA.

Amomum repens.†
Amomum zingiber.‡
Amomum zedoaria.

Cl.—DIANDRIA.

ORD.—MONOGYNIA.

Olea Europæa.
Rosmarinus officinalis.
Salvia officinalis.
Gratiola officinalis.

ORD.—TRIGYNIA.

Piper nigrum.
longum.
caudatum.

Cl.—TRIANDRIA.

ORD.—MONOGYNIA.

Valeriana officinalis.
Crocus sativus.
Iris florentina.

ORD.—DIGYNIA.

Saccharum officinarum.
Triticum hybernum.

Cl.—TETRANDRIA.

ORD.—MONOGYNIA.

Rubia tinctorum.
Santalum album.
Dorstenia contrayerva.

* From the progress of botanical knowledge, changes are necessarily made with regard to the specific or generic distinctions of the plants employed in medicine. Wherever these appear to be fully established, I have admitted them in the following tables: but where they have been only lately introduced, and remain somewhat doubtful, I have thought it preferable to retain the old name and arrangement, indicating only in a note the change that has been proposed, and the Pharmacopœia in which it has been adopted. Under the history of the substance referred to in the body of the work, will be found the authority on which the proposed alteration rests.

† Elettaria Cardamomum, Ph. Lond.

‡ Zingiber Officinale, Ph. Lond.

CL.—PENTANDRIA.

ORD.—MONOGYNIA.

Hyoscyamus niger.
Atropa belladona.
Nicotiana tabacum.
Datura stramonium.
Solanum dulcamara.
Strychnos nux vomica.
Capsicum annuum.
Cinchona officinalis.*
Anchusa tinctoria.
Spigelia marylandica.
Callicocca ipecacuanha.
Convolvulus jalapa.
Convolvulus scammonium.
Rhamnus catharticus.

ORD.—DIGYNIA.

Gentiana lutea.
Conium maculatum.
Ferula assafœtida.
Bubon galbanum.
Carum carui.
Coriandrum sativum.
Pimpinella anisum.
Anethum fœniculum.
Angelica archangelica.

ORD.—TRIGYNIA.

Rhus toxicodendron.

ORD.—PENTAGYNIA.

Linum usitatissimum.

CL.—HEXANDRIA.

ORD.—MONOGYNIA.

Calamus acorus.
Allium sativum.
Scilla maritima.
Aloe spicata.

CL.—HEPTANDRIA.

ORD.—MONOGYNIA.

Æsculus hippocastanum.

CL.—OCTANDRIA.

ORD.—MONOGYNIA.

Amyris opobalsamum.
Daphne mezereum.

ORD.—TRIGYNIA.

Polygonum bistorta.

CL.—ENNEANDRIA.

ORD.—MONOGYNIA.

Laurus cinnamomum.
Laurus cassia.
Laurus camphora.
Laurus sassafras.

ORD.—TRIGYNIA.

Rheum palmatum.

CL.—DECANDRIA.

ORD.—MONOGYNIA.

Cassia senna.
Cassia fistula.
Ruta graveolens.
Guaiacum officinale.
Toluifera balsamum.
Myroxylon peruiferum.
Styrax officinale.
Styrax benzoinum.
Copaifera officinalis.
Hæmatoxylon Campechianum.
Swietenia febrifuga.
Swietenia mahagoni.
Quassia amara.
Quassia simarouba.
Arbutus uva ursi.
Rhododendron chrysanthum.

CL.—DODECANDRIA.

ORD.—MONOGYNIA.

Asarum Europæum.
Canella alba.

ORD.—TRIGYNIA.

Euphorbia officinalis.

* Cinchona cordifolia, lancifolia et oblongifolia, Ph. Lond.

Cl.—ICOSANDRIA.

ORD.—MONOGYNIA.

Myrtus pimenta.
Prunus lauro-cerasus.
Amygdalus communis.
Eugenia caryophyllata.

ORD.—POLYGYNIA.

Rosa centifolia.
Rosa Rubra.
Tormentilla erecta.*

Cl.—POLYANDRIA.

ORD.—MONOGYNIA.

Papaver somniferum.

ORD.—TRIGYNIA.

Aconitum napellus.

ORD.—POLYGYNIA.

Heleborus niger.

Cl.—DIDYNAMIA.

ORD.—GYMNOSPERMIA.

Hyssopus officinalis.
Mentha piperita.
Mentha viridis.
Mentha pulegium.
Lavandula spica.

ORD.—ANGIOSPERMIA.

Digitalis purpurea.

Cl.—TETRADYNAMIA.

ORD.—SILICULOSÆ.

Cochlearia armoracia.

ORD.—SILIQUOSÆ.

Sinapis alba.

Cl.—MONADELPHIA.

ORD.—TRIANDRIA.

Tamarindus Indica.

ORD.—POLYANDRIA.

Althæa officinalis.
Malva sylvestris.

Cl.—DIADELPHIA.

ORD.—OCTANDRIA.

Polygala senega.

ORD.—DECANDRIA.

Pterocarpus santolinus.
draco.
Dolichos pruriens.
Geoffroya inermis.
Glycyrrhiza glabra.
Astragalus tragacantha.†

Cl.—POLYADELPHIA.

ORD.—ICOSANDRIA.

Citrus aurantium.
Citrus medica.

ORD.—POLYANDRIA.

Melaleuca leucadendron.‡

Cl.—SYNGENESIA.

ORD.—POLYGAMIA ÆQUALIS.

Lactuca virosa.

ORD.—POLYGAMIA SUPERFLUA.

Artemisia santonica.
Artemisia absinthium.
Anthemis nobilis.
Anthemis pyrethrum.
Arnica montana.

* Tormentilla officinalis.

† Astragalus verus, Ph. Lond.

‡ Melaleuca cajuputi, Ph. Lond.

Cl.—GYNANDRIA.

ORD.—DIANDRIA.
Orchis Mascula.

ORD.—HEXANDRIA.
Aristolochia serpentaria.

ORD.—POLYANDRIA.
Arum maculatum.

Cl.—MONŒCIA.

ORD. POLYANDRIA.

Quercus pedunculata.
Quercus cerris.

ORD.—MONADELPHIA.
Pinus balsamea.
Pinus larix.
Pinus sylvestris.
Pinus abies.
Pinus picea.
Croton eleutheria.
Ricinus communis.

ORD.—SYNGENESIA.
Momordica elaterium.
Cucumis colocynthis.
Bryonia alba.

Cl.—DIŒCIA.

ORD.—PENTANDRIA.
Pistacia lentiscus.
Humulus lupulus.

ORD.—HEXANDRIA.
Smilax sarsaparilla.

ORD.—MONADELPHIA.
Juniperus communis.
Juniperus sabina.
Myristica moschata.

Cl.—POLYGAMIA.

ORD.—MONOECIA.
Veratrum album.
Stalagmitis cambogioides.
Mimosa nilotica,*
Mimosa catèchu.†

ORD.—DIOECIA.
Fraxinus ornus.

Cl.—CRYPTOGAMIA.

ORD.—FILICES.
Polypodium filix mas.‡
Cycas circinalis.

Ammoniacum.§
Sagapenum.
Myrrha.
Kino.‖
Angustura.¶
Colombo.

* Acacia vera, Ph. Lond.
† Acacia catechu, Ph. Lond.
‡ Aspidium filix mas, Ph. Lond.
§ Heracleum gummiferum, Ph. Lond.
‖ Eucalyptus resinifera, Ph. Ed. Butea frondosa, Ph. Dub.
¶ Cusparia febrifuga, Ph. Lond.

ANIMALIA.

CLASSIS.—MAMMALIA.

Moschus.
Castoreum.
Cornu cervi.
Sevum ceti.
Axungia porcina.
Sevum ovillum.

CL.—PISCES.

Ichthyocolla.

CL.—INSECTA.

Meloe vesicatorius.*
Cera.
Coccinella.
Lapilli et chelæ cancrorum.

CL.—VERMES.

Os sæpiæ.
Corallium.
Spongia.

* Lytta vesicatoria.

END OF VOLUME FIRST.

A

SYSTEM

OF

MATERIA MEDICA

AND

PHARMACY:

BY

J. MURRAY,

LECTURER ON CHEMISTRY, AND ON MATERIA MEDICA AND PHARMACY, EDINBURGH.

WITH NOTES

BY N. CHAPMAN, M. D.

PROFESSOR OF MATERIA MEDICA IN THE UNIVERSITY OF PENNSYLVANIA.

IN TWO VOLUMES.

VOL II.

NEW-YORK:

PUBLISHED BY SAMUEL WOOD & SONS,
NO. 261, PEARL-STREET;
AND SAMUEL S. WOOD & CO. NO. 212, MARKET-ST.
BALTIMORE.

1821.

CONTENTS

OF

VOLUME SECOND.

APPENDIX.

PART II.

OF PHARMACY.

THE objects of Pharmacy are the Preservation, Preparation, and Composition of Medicines. In the state in which these are afforded by nature, they are not always best adapted to the treatment of disease: they are often liable to change from spontaneous decompositions, which require therefore to be counteracted: their powers sometime reside, not in the entire matter of which they consist, but in principles capable of being extracted, and which are employed with advantage in an insulated state, or under peculiar forms; by chemical combinations, remedies altogether new are obtained; and, lastly, medicines frequently require to be combined to fulfil particular indications, or they are rendered more pleasant, more safe, and even more active, when given in a state of mixture. Pharmacy, regarded as an art, prescribes the rules by which the operations for the attainment of these objects are conducted, and as a science unfolds the principles on which they depend.

The Preservation of Medicines is generally speaking the least important part of Pharmacy. Those which are most liable to decomposition are the vegetable products, many of which, especially when the re-action of their elements is favoured by humidity, suffer such changes as weaken their medicinal properties. Changes, productive of the same result, are not unfrequently occa-

sioned by the action of air and light. The methods by which these are counteracted, of which the most important is Exsiccation, belong to this division of Pharmacy. It includes too the few general rules which are observed in collecting plants in that state of vigour and maturity in which they are possessed of the greatest degree of activity. And there belong to it also those operations which are necessary to preserve unaltered the few animal products employed in medicine.

Under the second branch of Pharmacy, the Preparation of Medicines, are included a number of important operations, agreeing in general in affording substances different, more or less in chemical constitution, from the substances operated on.

The medicinal powers of vegetable substances, it has already been remarked, frequently reside in peculiar proximate principles, which, from their relations to certain solvents, can be separated from each other; and thus, in many cases, the principle on which the medicinal activity of the substance depends, can be obtained in a pure and concentrated state. Resins, for example, are dissolved by alcohol, gums by water, extractive matter by either of these liquids, or by a mixture of both; and by this separation advantages are often obtained; the medicine is rendered more certain in its operation; it is more easily preserved, or more conveniently administered. On this are founded the various pharmaceutic preparations of infusions, decoctions, tinctures, medicated wines or vinegars, and extracts;—forms under which medicines are often employed in preference to their natural state.

The proximate principles of plants are sometimes obtained apart by other processes, as by distillation, or even by mechanical expression, whence other forms of preparation are obtained.

To this division belong too the Saline and Metallic Preparations. These are entirely the results of chemical processes; they are new remedies formed by chemical combination, and are possessed of properties altogether

different from those of the substances from which they are prepared.

In all these preparations, chemical changes are produced to a greater or less extent. Medicines are also, however, frequently given in a state of mixture, in which they either exert no mutual chemical action, or none producing any modification of their powers. This forms what is named Composition in Pharmacy. It is employed with different views; sometimes, for example, to conceal a medicine, to render it less unpleasant, or to give it a convenient form. And frequently more important advantages are attained; the action of one medicine on the system, or on a particular organ, so far co-operating with that of another, as to render its operation more certain, or more powerful, or even sometimes giving rise to such a modification, as to produce an effect different from that which would be obtained from the action of either.

Pharmacy, as practised in this country, is regulated by the Pharmacopœias of the respective Colleges. As many of the processes, however, are necessarily alike, there is no advantage in inserting the formula for every preparation, according to the different Parmacopœias. I have, therefore, followed a different method. Taking the Edinburgh Pharmacopœia as the basis of this part of the work, and adopting its arrangement and nomenclature, I have added, to a translation of its processes, such observations as appeared to me necessary under each, on the theory of the operation, the circumstances to be attended to in conducting it, and the medicinal powers and applications of the substance formed. The corresponding preparations in the London and Dublin Pharmacopœias I have thought it sufficient to indicate merely by name, where the processes by which they are obtained do not differ essentially from those of the other. When they do differ in any important particular, I have introduced them into the text, and I have also

given a place to the few preparations which have none corresponding to them in the Edinburgh Pharmacopœia. A system of Pharmacy is thus presented, without that tedious repetition, which is unavoidable, when the processes of all the Pharmacopœias are regularly introduced.

CHAPTER I.

PREPARATIONS OF SOME SIMPLE MEDICINES.

The first chapter in the Edinburgh Pharmacopœia is a miscellaneous one, including under this title, a few preparations which could not well be placed under the other chapters. I have added to it some similar preparations from the London and Dublin Pharmacopœias.

Herbarum et florum exsiccasio. Drying of Herbs and Flowers.

"Herbs and flowers are to be dried with the gentle heat of a stove, or a common fire, in such a quantity that the drying may be performed as quickly as possible. Their virtues are thus best preserved, the mark of which is their retaining completely their native colour. The leaves of hemlock, and others containing a subtile volatile matter, are, immediately after drying, to be rubbed to powder, and kept in glass vessels well stopt." Directions nearly similar are given by the Dublin College.

By drying herbs and flowers, or expelling a great part of the water they contain, those spontaneous chemical changes which are favoured by humidity are prevented, and they are rendered capable of being preserved. The more quickly they are dried, they retain in general their virtues more completely, care only being taken that too much heat be not applied, as part

of their volatile principles would be dissipated, and their flavour and medicinal qualities impaired. Even when dried, they suffer some changes in keeping, probably from the action of the air and light; and some do so more rapidly than others. Hemlock, in particular, has its colour and odour impaired in a very short time; it is therefore necessary to exclude it from the air, and likewise from exposure to light.

SCILLA MARITIMA EXSICCATA. Dried Sea Squill.

"Cut the root of the sea squill, its outer covering having been removed, transversely, into thin slices, and dry it by a gentle heat. The mark of its being properly dried is, that while it is rendered friable, it retains its bitterness and acrimony."

By drying, the squill loses about four-fifths of its weight, and with very little diminution of its powers, if too much heat has not been applied. It is in this state that squill is commonly employed in medicine, and for other pharmaceutic preparations. It requires to be kept in a dry place, as otherwise it regains its softness, and is liable to become mouldy.

PULPARUM EXTRACTIO. Extraction of Pulps.

Those fruits which afford a pulp, if they are unripe, or if ripe and dry, boil with a little water, that they may become soft. Then express the pulp through a hair-sieve, and boil it with a gentle heat in an earthen vessel, stirring it frequently that it may not burn, until it attain the consistence of honey.

The pulp of cassia fistula is to be boiled from the bruised pod; and then by evaporating the water, to be reduced to the due consistence. The pulps of ripe and fresh fruits are to be pressed through a sieve, without previous boiling.

These directions are given principally for the preparation of the pulps of several fruits which enter into the composition of the Electuary of Senna. Pulps are sel-

dom otherwise medicinally employed, and they cannot be long preserved unchanged.

The following general directions are given in the London Pharmacopœia, for collecting the vegetable articles of the Materia Medica.

"Vegetables are to be gathered from the soil and situations where they spontaneously grow, at a dry season, and not moistened with rain or dew; they ought to be collected annually, and if they have been kept for a longer period, ought to be rejected."

"Roots, in general, are to be dug up before their stalks or leaves shoot forth."

"Barks ought to be collected at that season at which they are most easily separated from the wood."

"Leaves are to be gathered after the flowers have unfolded, and before the seeds have ripened."

"Flowers are to be collected recently blown."

"Seeds are to be taken when they are ripe, and before they begin to fall from the plant. They ought to be preserved in the seed vessels."

PREPARATION OF VEGETABLES. Pharm. Lond.

"Vegetables, soon after they are collected, those excepted which are to be used in the recent state, are to be spread out lightly, so as to dry as quickly as possible, with a heat so gentle, that their colour may not change; they are then to be kept in proper vessels, or situations where the access of light and humidity may be excluded."

"Roots, which are ordered to be kept fresh, ought to be buried in dry sand. The root of squill before drying it, is to be cut transversely into thin slices, the outer dry layers being removed."

"Pulpy fruits, if they are not ripe, or, if ripe and dry, are to be exposed in a damp place until they become soft, then press out the pulp through a hair-sieve,

afterwards boil with a gentle heat, stirring frequently; lastly, dissipate the water by the heat of a water bath, until it has become of the proper consistence."

"On the pods of cassia bruised, pour boiling water, so as to wash out the pulp, which press first through a sieve with large holes, afterwards through a hair sieve, then evaporate the water by the heat of a water-bath, until the pulp attain the proper consistence."

"Press the pulp or juice of ripe and fresh fruits through a sieve without any previous boiling."

OF GUM-RESINS. Pharm. Lond.

"Separate OPIUM carefully from extraneous substances, especially on its external surface. Let it be kept in the state of soft Opium, fit for forming pills; and hard Opium, rendered so by having been dried in the heat of a water-bath, so that it can be rubbed to powder."

"Those GUM-RESINS are to be accounted of the best quality, which can be selected so pure, as to require no purification. If they appear to be less pure than this, boil them in water until they become soft, and press them by a press through an hempen bag; then put them aside, that the resinous part may subside. The liquor above being poured off evaporate it by the heat of a water-bath, adding towards the end of the evaporation the resinous part, and mixing it thoroughly with the gummy part into one mass."

"Those GUM-RESINS which melt easily may be purified by being put into an ox bladder, and kept in boiling water until they become soft, so that they may be separated from the impurities by being pressed through an hempen cloth."

"The BALSAM of STORAX is to be dissolved in rectified spirit, and strained; the spirit is then to be distilled with a gentle heat, until the balsam become of the proper consistence."

These directions, for the purification of GUM-RESINS, are the most proper perhaps that can be given; but they

are omitted by the Edinburgh College, as it is always preferable to use them medicinally, only when in that state in which they do not require purification ; for, however cautiously the operation may be performed, they are always liable to suffer some change, either from the dissipation of volatile principles, or from changes of composition in those which are fixed. The process is admissible, therefore, only with regard to gum-resins, which are to be applied externally, as ammoniac or galbanum, when they are to form the basis of plasters. STORAX is a substance so rarely employed in medicine, that the ordering it to be purified may be regarded as superfluous. The Dublin College have ordered its purification, by digesting it in water with a gentle heat, and pressing it when soft between plates of iron, made hot in boiling water,—a process which must dissipate its odorous matter, on which all its powers depend. The directions given by the London College with regard to OPIUM, are preferable to a process formerly admitted, and which is to be afterwards noticed, as being retained in the Dublin Pharmacopœia, in which opium is dissolved in proof spirit, and the tincture strained, and again evaporated to the due consistence,—a process in which the opium always sustains a diminution of power.

PREPARATIONS FROM ANIMALS. Pharm. Lond.

ADEPS PRÆPARATA. Prepared Lard.

"Cut the fat into small pieces; then press it, liquefied by a gentle heat, through linen."

SEVUM PRÆPARATUM. Prepared Suet.

"Cut suet into pieces; then press it, melted by a gentle heat, through linen."

The design of these processes is to free the fat from the membranous fibres intermixed with it ; but, as it is generally prepared before it is brought to the shops, the Edinburgh College have omitted the directions they

formerly gave. If the heat be raised too high, the fat acquires a brown colour and empyreumatic smell ; it is therefore usually melted with a little water, by which this is prevented.

CORNU USTUM. Burnt Horn. Ph. London. (Pulv. Cornu. Cerv. Uust. *Ph. Dub.*)

" Burn pieces of horn in an open fire, until they become perfectly white ; then rub them to powder, and prepare them in the same manner that chalk is prepared."

The base of horn, like that of bone, consists of phosphate of lime, or at least it is this earthy compound that remains when bones are burnt, mixed with a little carbonate and sulphate of lime ; and in the bones of some animals, phosphate of magnesia and fluate of lime. The gelatin of the horn or bone is decomposed during the burning ; its carbonaceous matter partly remains, giving a black colour, but by continuing the heat, this also is burnt out. The phosphate of lime is a substance apparently altogether inert, though, from a theoretical view, as to the cause of rickets and mollities ossium, it has been proposed to be given as a remedy in these diseases. It is used to reduce substances which are rather soft and tenacious, as opium, to powder, being rubbed along with them ; and its powder is sometimes employed as a dentifrice.

SPONGIA USTA. Burnt Sponge. Ph. Lond. (Pulvis Spongiæ Ustæ, *Ph. Dub.*)

" Cut sponge into pieces ; and bruise it, so that it may be freed from adhering extraneous bodies ; then burn it in a close iron vessel, until it become black and friable ; lastly, rub it into a very fine powder."

Burnt sponge has been celebrated as a remedy in bronchocele, and in scrofulous affections of the glands, given in a dose from 20 to 30 grains. It consists chiefly of carbonate of soda and carbonaceous matter ; but it has been stated as a reason for its being retained in the

London Pharmacopœia, that it produces effects as a medicine, which are not to be obtained from a mixture of the alkali and charcoal alone.

Burnt sponge has likewise a place in the Dublin Pharmacopœia, being prepared in a similar manner; and the following preparation is likewise inserted, which probably affords an analogous product.

PULV. QUERCUS MARINÆ. Powder of Sea Oak, or Sea Wrack. Pharm. Dub.

"Take of sea wrack with its vesicles any quantity. Free it from its impurities and dry it; then put it into an iron pot or crucible with a perforated cover, and expose it to the fire, until the vapour which arises cease, and the mass become of a dull red. Reduce the carbonaceous residuum to powder, and preserve it in close vessels."

TESTÆ PRÆPARATÆ. Prepared Shells. Pharm. Lond.

"Wash the shells previously freed from impurities with boiling water; then prepare them in the manner ordered with regard to chalk."

This process is designed to give a carbonate of lime purer than the prepared chalk. The product is at least more smooth, and free from the coarser earthy matter diffused through chalk. It contains too a portion of animal matter, probably gelatin, but so highly indurated as not to be easily extracted by water, and not to be liable to spontaneous decomposition.

UNDER this chapter, the Edinburgh College have inserted a preparation of sulphur, the Washed Sulphur; to which may be added, the Precipitated Sulphur of the London Pharmacopœia.

SULPHUR SUBLIMATUM LOTUM. Washed Sublimed Sulphur.

"Take of Sublimed Sulphur, one pound; water, four pounds. Boil the sulphur for a short time in the water, then pour off this water, and adding cold water wash away all the acid; lastly, dry the sulphur." A similar process has a place in the Dublin and London Pharmacopœias.

The sublimation of sulphur is usually conducted on a large scale, and the vapours of the sulphur, which first rise, receiving a little oxygen from the atmospheric air of the subliming vessel, or of the chamber in which they are condensed, a slight degree of acidity is liable to be acquired, which it is the object of this process to remove. Any acidity, however, is so slight, that it is scarcely perceptible in the sublimed sulphur of the shops; the process is therefore surperfluous, and is never attended to.

SULPHUR PRÆCIPITATUM. Precipitated Sulphur. Pharm Lond.

"Take of Sublimed Sulphur, one pound; lime recently prepared, three pounds. Boil the sulphur and the lime together in water; strain the liquor through paper, and drop into it muriatic acid, as much as may be sufficient to precipitate the sulphur. Lastly, pouring water on this frequently, wash it until it remain tasteless."

The sulphur is in the first stage of this process combined with the lime; and, at the same time, as always happens when sulphur is enabled to act on water, by the resulting affinity of an alkaline base, a decomposition of a portion of water takes place; its oxygen unites with a little of the sulphur, and forms sulphuric acid, with which part of the base combines; the hydrogen of the decomposed water unites with another portion of sulphur, forming sulphuretted hydrogen, and this enters into combination with the remaining sulphur, and base, and by its affinity prevents any farther decomposition. The solution, therefore, neglecting the small portion of sulphate which it may contain, is a ternary

compound of sulphur, sulphuretted hydrogen, and the alkaline or earthy base. When an acid is added, it combines with the base, and precipitates the sulphur, while the small quantity of sulphuretted hydrogen is disengaged in the elastic form. In the present process, therefore, the solution obtained by boiling the lime and sulphur, is a compound of these with sulphuretted hydrogen, what may be named a Sulphuretted Hydrosulphuret of Lime. On adding muriatic acid, it combines with the lime; and this muriate of lime being very soluble, remains dissolved in the water; the sulphuretted hydrogen is disengaged; and the sulphur being insoluble is precipitated.

The process, under this point of view, may be supposed to have no object, as the sulphur is merely recovered; and it cannot indeed be said to have much advantage. The precipitated sulphur, however, is of a whiter colour than sublimed sulphur, and is therefore preferred in making sulphur ointment, the only purpose to which it is applied. This whiteness may be owing either to its state of aggregation, or to its combination with a little water, for the yellow colour is restored on melting it. That it is owing to the presence of water, is rendered probable, from the same whiteness being produced by dropping water on melted sulphur, or receiving the vapours of sulphur in a vessel filled with watry vapour. Common sulphur, it appears from recent experiments, contains hydrogen with a little oxygen; and it is not improbable, that precipitated sulphur may contain a larger proportion of hydrogen, which it may attract in its precipitation. The whiteness of the precipitated sulphur of the shops is usually increased by precipitating the solution of the sulphuretted hydrosulphuret of lime, not by muriatic, but by sulphuric acid, the sulphate of lime being thrown down, intimately mingled with the sulphur. This renders it less fit for internal administration.

CHAPTER II.

CONSERVÆ.—CONSERVES.

Conserves are compositions of fresh vegetable matter with sugar. The form is designed to preserve such vegetables as lose their virtues by drying: to obviate the decomposition to which this matter is liable, three times its weight of refined sugar is in general necessary. The active matter of vegetables is, however, generally injured by keeping in this form; and, therefore, there is no conserve ordered in the Pharmacopœia of any powerful medicine, those which are inserted being merely recommended by their agreeable flavour, and being not used but as vehicles for the exhibition of more active remedies, under the form of bolus, pill, or electuary.

In the Èdinburgh Pharmacopœia there are the following conserves:

Conserva exterioris recentis fructus Citri Aurantii radula abrasa. Conserve of the outer rind of the Orange rasped by a grater.

Conserva Fructus Rosæ Caninæ maturi, a seminibus eorumque pube sollicite purgati. Conserve of the fruit of the Dog-hip, carefully freed from the seeds and included down.

Conserva Petalorum Rosæ Gallicæ nondum explicitorum. Conserve of the unblown Petals of the Red Rose.

In the preparation of these, the vegetable matter is directed to be beat into a pulp, to which is to be added gradually, during the beating, three times its weight of refined sugar.

The first of them, the Conserve of Orange Peel, is so little used, that it is seldom to be found in the shops. The Conserve of Dog-hip is smooth and uniform in its consistence, and is therefore well adapted to the purpose

to which it is applied, that of serving as a vehicle for active medicines, under the form of bolus or pill. The Conserve of the Petals of the Red Rose is supposed to retain their slight astringency, and at one time was celebrated as a remedy in hæmoptysis and phthisis. It is still a popular medicine in these diseases, being taken in the dose of an ounce in the morning, diffused in warm milk.

The London College have united the Conserves with the preparations named Electuaries, and have given them the common name of Confections. Of those which correspond with what have usually been denominated Conserves, they have retained the three which have a place in the Edinburgh Pharmacopœia. The Dublin College admit only the Conserve of the Rind of the Orange, and the Conserve of the Petals of the Red Rose.

CHAPTER III.

SUCCI.—JUICES.

Juices are obtained from fresh vegetables by expression. They consist chiefly of the sap of the plant, mixed, however, more or less, with the proper juices; and according as these are in greater or less abundance, or easily expressed from their vessels, the juice will be more largely impregnated with them. It may hold dissolved mucilage, extractive matter, tannin, and any of the vegetable acids; and fecula is frequently suspended in it, with sometimes perhaps a portion of resin, diffused by the medium of the other principles.

When newly expressed, these juices are generally impure and viscid: on standing for some time, they deposite a quantity of mucilaginous matter, along with grosser impurities; the clear liquor is poured off, and passed repeatedly through a fine linen cloth, by which it is rendered more pure. A small quantity of alcohol,

generally about one-fortieth part of the weight, is added; the juice, on standing, deposites, after this addition, another sediment; from this it is poured off, and the clear liquor is put into bottles, which are to be kept in a cool place. By these proceses, however, much of the active matter is frequently removed, or chemically changed, and the juice is rendered comparatively inert; and besides it is always liable to decomposition on keeping, from the re-action of the elements of the vegetable matter. This form of preparation is therefore an improper one; it is rejected, with propriety, from the London and Dublin Pharmacopœias; and there is only one officinal juice retained by the Edinburgh College, which might also be discarded, as it is never used, nor kept in the shops. It is named

Succus cochleariæ compositus, *vulgo Succi ad Scorbuticos.*
Compound Juice of Scurvy Grass.

"Take of Juice of Scurvy Grass, Juice of Water Cresses from the herbs recently gathered, Juice of the fruit of the Orange, of each two pounds; Spirit of Nutmeg, half a pound. Mix them, and put aside the liquor until the impurities subside; then pour it off."

This used to be employed as a remedy in scurvy, in the dose of half a pound daily; but it has long been in total disuse.

CHAPTER IV.

SUCCI SPISSATA, VULGO EXTRACTA.—INSPISSATED JUICES, COMMONLY NAMED EXTRACTS.

The juice expressed from succulent vegetables, frequently holds dissolved, or diffused through it, the principles in which the medicinal powers of the plant reside. But containing a large proportion of water, and being liable to decomposition, the process of inspissation is em-

ployed to obtain the active matter in a more concentrated state, and to obviate this spontaneous change The preparations thus obtained are named Inspissated Juices, formerly Extracts.

In the greater number of cases, however, this operation cannot be performed without injury to the active matter. Any volatile principle is necessarily dissipated; and even where there is no injury of this kind, the vegetable matter, at the temperature required, suffers decomposition, either from the re-action of its elements, in consequence of which they enter into new combinations, or from the chemical action of the oxygen of the air. Extractive matter, such as that contained in the juices of plants, becomes insoluble from mere exposure to the air, as Vauquelin observed: this change takes place more rapidly at the temperature of boiling water, as Fourcroy has shown; and T. Saussure, who has exmined these changes more minutely, has found that they are accompanied with an absorption of oxygen from the air, and a formation of carbonic acid, with probably, likewise, as he inferred, a formation of water, from the union of part of the oxygen and hydrogen of the vegetable matter. Such changes must give rise to alterations in the medicinal powers of these substances, and hence we cannot rely on the activity and uniformity of operation in these inspissated juices Even after they are prepared too, they must continue to suffer a slow spontaneous decomposition, and hence their activity must diminish with age.

From the analysis of these inspissated juices, they appear to contain usually a large proportion of saline matter, principally acetates of potash, lime and ammonia, frequently free acetic acid, and sulphate and muriate of potash, and sulphate of lime.

The directions for preparing the inspissated juices are given in the Edinburgh Pharmacopœia, under the formula for the first of them, that of Wolfsbane The Dublin College direct, that the juice, after expression, shall remain at rest for six hours, that its feculencies may

subside before evaporation. The London College, with more propriety, order it to be evaporated without depuration.

Succus spissatus aconiti napelli. Inspissated Juice of Aconite or Wolfsbane.

"The fresh leaves of the aconite are to be bruised, and being enclosed in a hempen bag, are to be pressed strongly, that they may give out their juice, which is to be reduced by evaporation in open vessels, heated by boiling water saturated with muriate of soda, to the consistence of thick honey. The mass, after it has cooled, is to be kept in glazed earthen vessels, and moistened with alcohol."

This inspissated juice is the form under which wolfsbane was introduced into practice by Störck. He recommended it in glandular swellings, scrofulous and venereal affections, gout, and in obstinate chronic rheumatism, in a dose of half a grain night and morning, and gradually increased to five or six grains. It is very seldom prescribed.

In the same manner are prepared the following Inspissated Juices from the leaves of their respective plants.

Succus spissatus atropæ belladonæ. Inspissated Juice of Deadly Nightshade.

This has been recommended by the German practitioners in schirrus, cancer, in epilepsy and mania, in a dose of one grain gradually increased. It retains the peculiar property of the plant, that of occasioning dilatation of the pupil, whence it has also been prescribed in amaurosis.

Succus spissatus conii maculati. Inspissated Juice of Hemlock.

Under this form, hemlock was employed by Störck in schirrus and cancer. The dose given is at first two grains, but it requires to be quickly increased, and it

has at length been taken to the extent of several drachms in the day. In the preparation of it, the narcotic power of the hemlock seems always to be more or less impaired; it is also injured by keeping, and we have no other test of its activity than the strength of its narcotic odour. It is therefore inferior to the dried leaves of the plant, which are likewise, however, liable to a considerable degree of uncertainty, according to the manner in which they have been dried and preserved. A common form of exhibition is that of the inspissated juice made into pills by the addition of a sufficient quantity of the powder of the leaves; but, on the whole, the powder alone is to be preferred, both as being in general more active and uniform, and as we have a test of its proper preparation more certain in the richness of its green colour.

Succus spissatus hyoscyami nigri. Inspissated Juice of Black Henbane.

This inspissated juice retains a considerable degree of narcotic power, and the plant resembling opium in its operation, it is occasionally employed as a substitute for it. The dose has been usually one grain, which requires to be increased; two grains are perhaps not more than equivalent to one grain of opium. The tincture has been introduced as a more certain preparation.

The London College admit the four preceding Inspissated Juices, giving them the name of Extracts. The Dublin College have inserted those only of Hemlock and Henbane.

Succus spissatus lactucæ virosæ. Inspissated Juice of Strong-scented Lettuce. *Ph. Ed.*

This plant, though a narcotic, has been principally used as a diuretic. It was recommended as a remedy in dropsy by the German practitioners, in a dose of four or five grains, gradually increased to one or two drachms in twenty-four hours; but in this country it has been little used.

Succus spissatus sambucci nigræ, *vulgo Rob Sambuci.* Inspissated Juice, or Rob of Elder.

The preparation of this juice, as directed in the Edinburgh Pharmacopœia, is peculiar. "Five pounds of the juice of Elder Berries, and one pound of Sugar, are to be boiled with a gentle heat to the consistence of thick honey."

It has been given as an aperient or moderate laxative and diuretic in a dose of half an ounce, or one ounce; but it possesses no quality to recommend it. In the preparation of it in the Dublin Pharmacopœia, it is merely inspissated without sugar.

Succus spissatus momordicæ elaterii, *vulgo Elaterium.* Inspissated Juice of Wild Cucumber, or Elaterium.

"Cut the ripe fruit of the wild cucumber, and pass through a very fine hair-sieve, the juice lightly expressed; boil it a little, and set it aside for some hours, until the thicker parts subside. Pour off the thinner part which floats above, and separate the rest by straining. The thicker part which remains after the straining, being covered with a linen cloth, is to be dried by a gentle heat." Similar directions are given in the Dublin and London Pharmacopœias, omitting only the boiling,—an omission which is proper, if this substance be a fecula, as has been usually supposed.

From the mode of preparation, it is obvious that this consists of a matter which had been suspended in the juice, and hence it has been generally regarded as a species of fecula, without having been, however, very particularly examined. It is a very violent cathartic, operating powerfully in a dose of one or two grains. It has been used as a hydrogogue in dropsy, and as a cathartic in obstinate constipation, where others have failed. The violence, and in some measure the uncertainty of its operation, prevent its frequent use; and it is seldom even to be found in the shops.

CHAPTER V.

OLEA FIXA SIVE EXPRESSA.—FIXED OR EXPRESSED OILS.

Expressed oils are distinguished by their unctuosity and insipidity, by being insoluble in water and in alcohol, by being incapable of volatilization, without change, and by combining with the alcalis, forming soaps. They exist in the fruit and seeds of vegetables, and are obtained by expression, or decoction with water. The former method is in general to be preferred; and to afford the oil pure it must be performed without heat, which, though it favours the separation of the oil, communicates to it acrimony and an unpleasant flavour. To preserve them from becoming rancid, they ought to be kept secluded from the air, this change being produced in them by absorption of oxygen.

A process in Pharmacy somewhat difficult is to mix these oils with any watery fluid, so that they may be conveniently exhibited. It is usually done by the medium of mucilage, or of an alcali. If triturated with mucilage, and a small quantity of sugar, the oil is diffused through the water, and a milky liquor is formed, in which, however, the diffusion is rather imperfect. A combination more complete and permanent is effected, by adding a few drops of water of ammonia, or two or three grains of sub-carbonate of potash.

The directions for preparing these oils in the Edinburgh Pharmacopœia, are given under the Oil of Almonds.

Oleum amygdalæ communis. Oil of Almonds.

"Take of Fresh Almonds any quantity. Bruise them in a stone mortar, inclose them in a hempen bag, and express the oil by a press without heat."

The oil thus obtained is the purest of the expressed

oils, being limpid and entirely free from odour or taste. It is used as a demulcent, and for the general medicinal purposes to which expressed oils are applied.

In the same manner is to be expressed Oleum lini usitatissimi, Oil of Lintseed, from the seeds of the plant. Being less pure, it is used only as an external application. Usually, it is prepared on the large scale; and to remove the mucilage, heat is employed.

To these the London College add Oleum ricini, Castor Oil, ordering it to be prepared by bruising the seeds, from which the external pellicle has been removed, and expressing the oil without any application of heat. This oil is usually prepared, however, in the West Indies by decoction, and is milder than when obtained by expression. The Olive Oil, Oleum oleæ europææ, which of all the expressed oils is most largely employed, is imported from the South of Europe.

CHAPTER VI.

EMULSIONES.—EMULSIONS.—MISTURA.—MIXTURES.

Emulsions are preparations in which the expressed oil of the seeds or kernels, from which they are made, is diffused through water by the medium of the sugar, mucilage, and fecula, which the seeds contain. They may be made from lintseed, from the seeds of the poppy, and from other oily seeds: but they are always ordered to be prepared from almonds, as being free from any disagreeable flavour or taste. They are always opaque and milky. As the oil is merely diffused through the water, it gradually separates and rises towards the surface. The fluid beneath is like whey in its appearance, and it soon becomes acescent from the slow fermentation of the saccharine matter. The addition of vinous spirits, or of any weak acid, decomposes emul-

sions, separating the oil. In prescribing them, therefore, it is necessary to avoid combining with them any tincture, or any substance having acidity.

Emulsio amygdalæ communis. Almond Emulsion. (Mist. Amygdalæ, *Ph. Lond.*—Lac. Amygdal. *Dub.*)

" Take of Sweet Almonds, one ounce; Water, two pounds and a half; beat the blanched almonds carefully in a stone mortar, adding the water gradually, then strain."

The almonds are blanched, or freed from their thin rind, by keeping them a minute or two in boiling water, when the rind is easily detached. They require to be well beat as the water is added. The emulsion is used as a diluent and demulcent in catarrh and gonorrhœa, or during the application of a blister, being drunk *ad libitum*, and it is more grateful than any other preparation.

Emulsio gummi mimosæ niloticæ, *vulgo Emulsio Arabica.* Arabic Emulsion. (Emulsio Arabica, *Ph. Dub.*)

" This is made in the same manner, adding, while beating the almonds, two ounces of mucilage of gum Arabic."

It is used in the same cases as the preceding, and from the addition of the mucilage is supposed to have rather more demulcent power.

Emulsio camphorata. Camphor Emulsion.

" Take of Camphor, one scruple; blanched Sweet Almonds, two drachms; Refined Sugar, one drachm; Water, six ounces: Let it be made in the same manner as the Almond Emulsion."

Camphor is less apt to occasion nausea or uneasiness at the stomach when given in a liquid than when in a solid form; and this is one of the best forms of preparation, the camphor being completely diffused. Its dose is two ounces, but as this narcotic is not much employed internally in modern practice, the camphor emulsion is not often prescribed.

MISTURA.—MIXTURES.

To the preparations named Emulsions, the London College have extended the general name of Mixture, which is employed in Pharmacy to denote those preparations in which different ingredients are mingled together in the liquid form, or in which solid substances are diffused through liquids by the medium of mucilaginous or saccharine matter. And under this name of Mixture are inserted several compound medicines, both in the London and Dublin Pharmacopœia, of which it is necessary to take notice. Some of these had formerly a place in the Edinburgh Pharmacopœia; but they have been discarded, probably from the consideration that they must always be prepared extemporaneously, and may therefore be varied according to the intention of the prescriber.

Mistura ammoniaci. Gum Ammoniac Mixture. Ph. Lond. (Lac Ammoniac. *Ph. Dub.*)

"Take of Gum Ammoniac, two drachms; Water, half a pint. Triturate the Ammoniac with the water poured on it gradually until they are intimately mixed." In the Dublin Pharmacopœia, one drachm of Gum Ammoniac is diffused by trituration in eight ounces of Pennyroyal Water, and the mixture is strained through a linen cloth.

In these mixtures the resinous matter is suspended in the water by the medium of the gum, and a milky liquor is formed. From this the resin subsides slowly. Under this form this gum-resin is sometimes prescribed as an expectorant, the dose of the mixture being from half an ounce to an ounce.

Mistura assafoetidæ. Assafœtida Mixture. Ph. Lond. (Lac Assafœtidæ, *Ph. Dub.*)

"Take of Assafœtida, two drachms; Water, half a pint. Rub the assafœtida with the water added gradually until they are perfectly mixed." In the Dublin Pharma-

copœia, one drachm of Assafœtida is diffused by trituration in eight ounces of Pennyroyal Water.

The resin of the assafœtida is in this mixture likewise suspended in the water by the medium of the gum. It is a form under which this fœtid drug is prescribed in the hysteric paroxysm, from half an ounce to an ounce being given and repeated at short intervals.

Mistura camphoræ. Camphor Mixture. Ph. Lond. (Mistura Camphorata, *Ph. Dub*.

"Take of Camphor, half a drachm; Rectified Spirit, ten minims; Water, a pint. Rub the camphor first with the spirit, then add the water gradually, and strain." In the Dublin Pharmacopœia, the preparation is a little different; one scruple of Camphor being rubbed with ten drops of rectified spirit; half an ounce of refined sugar being added, and a pound of water, and the liquor being strained through a linen cloth.

Boiling water was formerly ordered in making this mixture, by which much of the camphor was volatilized, and very little dissolved. Even at a low temperature, the water scarcely dissolves any appreciable quantity, and it can be regarded only as receiving odour and some degree of taste, without any such impregnation as shall communicate to it medicinal efficacy.

Mistura cornu usti. Mixture of burnt Horn. Ph. Lond. (Decoctum Cornu Cervini. Decoction of Hartshorn, *Ph. Dub.*)

"Take of Burnt Horn, two ounces; Gum Arabic in powder, one ounce; Water, three pints. Boil down to two pints, stirring constantly; then strain."

This is an absurd preparation, introduced at a time when the principles of Pharmacy were nearly unknown, and retained merely from the influence of habit. The burnt hartshorn, (which is chiefly phosphate of lime), is perfectly insoluble in water; the gum alone therefore is dissolved; the hartshorn, by the continued boiling, is diffused, and kept suspended by the mucilaginous liquid; but this might equally be done without this ope-

ration; and when done it can communicate to the preparation no medicinal power.

MISTURA CRETÆ. Chalk Mixture. *Ph. Lond. and Dub.*

"Take of Prepared Chalk, half an ounce; Refined Sugar, three drachms; Gum Arabic in powder, half an ounce; Water, a pint. Mix them."

The chalk is in this mixture suspended by the mucilage; it is taken as an antacid in the dose of one or two ounces occasionally; but it may be doubted whether the mucilage and sugar will not rather be injurious in that state of the stomach which generates acidity.

MISTURA FERRI COMPOSITA. Compound Mixture of Iron. Ph. Lond.

"Take of Myrrh in powder, one drachm; Sub-carbonate of Potash, twenty-five grains; Rose Water, seven fluid ounces and a half; Sulphate of Iron in powder, one scruple; Spirit of Nutmeg, half a fluid ounce; Refined Sugar, a drachm. Rub the myrrh with the sub-carbonate of potash and the sugar, and, during the rubbing, add first the rose water, and the spirit of nutmeg, and afterwards the sulphate of iron. Put the mixture immediately into a proper glass vessel, which stop closely."

This, with a few trivial alterations, is the celebrated Antihectic Mixture of Griffith; which, as first invented, was undoubtedly an unchemical mixture, the prescriber not being aware of the changes produced in the active ingredients by their mutual action, but which, in practice, was found possessed of peculiar advantages. The sulphate of iron, it is obvious, is decomposed by the sub-carbonate of potash, the sulphuric acid combining with the potash, while the carbonic acid unites with the oxide of iron. The carbonate of iron which is formed is diffused in the mixture along with the myrrh, and both are probably kept more completely suspended by an excess of alcali. This chalybeate proves much less irritating than the sulphate of iron, producing no unpleasant effect on the stomach, and at the same time it

is more active than the common carbonate or rust of iron, in which the iron is at the maximum of oxidation, while, in the present preparation, it is at the minimum, is in a different state of aggregation, and probably combined with a larger quantity of carbonic acid. To preserve it in this low state of oxidation, it is ordered to be kept in a bottle closely stopped; but as iron has a strong tendency to pass to a more highly oxidated state, and suffers this change very rapidly from the action of the air, it is preferable that the preparation should be always extemporaneously made. Griffith's Mixture was employed as a remedy in hectic fever, in chlorosis, and other diseases in which iron is given as a tonic. The mixture of the London Pharmacopœia, which is nearly of the same strength, may be given in the same cases in a dose of an ounce once or twice a day.

MISTURA GUAIACI. Guaiac Mixture. Ph. Lond.

"Take of the Gum-Resin of Guaiac, a drachm and a half; Refined Sugar, two drachms; Mucilage of Gum Arabic, two fluid drachms; Cinnamon Water, eight fluid ounces. Rub the guaiac with the sugar, then with the mucilage, adding gradually, while these are rubbed together, the cinnamon water."

This may be a convenient form, for the exhibition of guaiac, though there appears to be no great advantage in multiplying these extemporaneous prescriptions.

MISTURA MOSCHI. Musk Mixture. Ph. Lond.

"Take of Musk, Gum Arabic, Refined Sugar, of each one drachm; Rose Water, six fluid ounces. Rub the musk with the sugar, then with the gum, and add gradually the rose water."

The same observation applies to this as to the preceding preparation. Its dose, when it is prescribed, is an ounce, or an ounce and a half.

CHAPTER VII.

INFUSA.—INFUSIONS.

Infusion is a general term, which might be applied to that process by which the soluble parts of any solid are extracted by the action of any fluid kept in contact for some time with the body on which it acts. In Pharmacy it is usually limited to that case where the active matter of vegetable substances is extracted partially or completely by water, though it is sometimes extended to the same process where other liquors, as alcohol, are employed. It is in the former sense, as denoting an aqueous preparation, that the term is used in the Pharmacopœias; and Infusions are solutions of vegetable matter in water obtained by maceration.

Several of the proximate principles of vegetables being soluble in water, they can often, by this operation, be extracted with advantage. But there are others with regard to which it is altogether useless. Thus the purgative quality of rhubarb is extracted by infusion in water: even the cathartic powder of senna, though it appears to reside in a principle more peculiarly soluble in alcohol, is still obtained by the action of water, when a large quantity is employed, and its solvent power is promoted by heat. But the power of jalap is scarcely obtained, the watery infusion of it being comparatively weak. In prescribing infusions, therefore, regard must always be had to the composition of the substances ordered to be infused. In general, mucilaginous plants yield their mucilage readily to water: bitterness and astringency are also usually extracted by water with facility, and the aromatic quality where this resides in an essential oil. With regard to other properties, scarcely any general rule can be delivered.

The quantity and quality of the matter extracted by infusion, are considerably varied by the temperature of

the fluid. Infusions made with warm water, are considerably stronger than those made with cold ; in some cases, however, especially with respect to bitters, they are less grateful. In the Bitter Infusion, therefore, of the Edinburgh Pharmacopœia, cold water is directed to be used ; in all the others, boiling water is ordered to be poured on the materials of the infusion, and the vessel is generally placed near a fire.

It is rather singular, that dried vegetables yield their virtues to water by infusion, more readily than when they are in the recent state, probably from the vegetable matter being more easily penetrated by the water.

Infusions are always injured by keeping. Though at first transparent, they soon become more or less turbid ; they deposite a mucous-like substance ; lose their peculiar taste, and after some time acquire a putrid smell,—changes owing to the gradual decomposition of the vegetable matter they hold dissolved. Infusions are therefore never kept ready prepared in the shops ; they are to be regarded as extemporaneous preparations, which, in general, require several hours before they can be prepared.

Infusum cinchonæ officinalis. Infusion of Peruvian Bark. (Infus. Cinchonæ, *Ph. Lond. Dub.*

" Take of Peruvian Bark in powder, one ounce ; Water, one pound. Macerate them for twenty-four hours, and strain." The formula, as given in the other Pharmacopœias, is nearly the same, only that boiling water is ordered to be poured on the bark, by the London College, while by the Dublin College the maceration is without heat.

By infusion, water is capable of dissolving only a small portion of the active matter of bark, and the preparation therefore cannot be regarded as having much activity. It is used principally as a bitter in dyspepsia, in a dose of two ounces occasionally.

INFUSUM DIGITALIS PURPUREÆ. Infusion of Foxglove. (Infus. Digital. *Ph. Lond.*

" Take of the dried leaves of Foxglove, one drachm; Boiling Water, eight ounces: Spirit of Cinnamon, one ounce. Macerate for four hours, and strain."

Infusion is the form under which Dr. Withering, who introduced the use of digitalis in dropsy, recommended it to be given, and it is on the whole the best form under which it can be given, with the view at least to obtain its diuretic operation. The above is the formula of Withering, and it has likewise been received with no essential difference into the London Pharmacopœia. Its dose is an ounce taken twice a day, and continued until the effects of the remedy appear.

INFUSUM GENTIANÆ LUTEÆ COMPOSITUM, *vulgo Infusum Amarum.* Compound Infusion of Gentian. (Infus. Gentianæ, *Ph. Lond. Dub.*)

" Take of Gentian Root cut, half an ounce; Dried Orange-Peel bruised, one drachm; Coriander Seeds bruised, half a drachm; Diluted Alcohol, four ounces; Water, one pound. First pour on the alcohol, and after three hours the water; then macerate without heat for twelve hours, and strain."

This bitter infusion is employed in dyspepsia: a sufficient quantity of alcohol is added to aid the solvent power of the water, and to preserve the infusion from spontaneous decomposition, while there is not so much as to give spiritous pungency. It is therefore better adapted to continued use than the bitter tinctures. Its dose is two ounces occasionally. The Dublin College have a similar preparation, under the same name. The London College omit the alcohol; and in an infusion which may be always extemporaneously prepared, and does not therefore require to be long kept, this is perhaps preferable, as avoiding the pernicious consequences arising from the stomach being accustomed to the stimulus of ardent spirit.

INFUSUM MIMOSÆ CATECHU, *vulgo Infusum Japonicum.* Infusion of Catechu. (Infus. Catechu, *Ph. Lond.*)

"Take of Extract of Catechu in powder, two drachms and a half; Bark of Cinnamon bruised, half a drachm; Boiling Water, seven ounces; Simple Syrup, one ounce. Macerate the extract and bark with the water in a closed vessel for two hours, then strain and add the syrup."

The Extract of Catechu is entirely soluble in water. This preparation, therefore, possesses all its virtues unimpaired, and rendered more grateful, by the addition of the cinnamon. Hence it is one of the best forms under which catechu can be prescribed, its principal use is in diarrhœa; dose, one ounce every third or fourth hour. A small quantity of tincture of opium is frequently added to it with advantage.

INFUSUM RHEI PALMATI. Infusion of Rhubarb. Infus. Rhei, *Ph. Lond.*)

"Take of the Root of Rhubarb bruised, half an ounce; Boiling Water, eight ounces; Spirit of Cinnamon, one ounce. Macerate the root with the water in a closed vessel for twelve hours, then, adding the spirit, strain the liquor."

The infusion of rhubarb is supposed to have more of the purgative than of the astringent power. It is accordingly used as a mild cathartic, in a dose of two or three ounces. There appears to be an unnecessary waste of rhubarb in the proportions ordered; and the formula in the London Pharmacopœia, in which only a drachm of rhubarb is ordered to eight ounces of water, is preferable, as this will probably afford as much active matter as the water can dissolve, or at least give an infusion sufficiently strong.

INFUSUM ROSÆ GALLICÆ. Infusion of Red Rose.

"Take of the Dried Petals of the Red Rose, two ounces; Boiling Water, five pounds; Sulphuric Acid, one drachm; Refined Sugar, two ounces. Macerate the petals with the boiling water in an earthen vessel, which

is not glazed with lead, for four hours; then having poured on the acid, strain the liquor, and add the sugar."

This infusion, which has a place in all the Pharmacopœias, is used principally as a moderately astringent gargle, in slight cases of cynanche, or to check salivation. It owes little else than colour, and a pleasant flavour, to the petals of the rose; the astringency depending almost entirely on the sulphuric acid.

Infusum tamarindi indicæ cum cassia sennæ. Infusion of Tamarind and Senna. (Infus. Sennæ cum Tamarindis, *Ph. Dub.*

"Take of the Prepared Fruit of the Tamarind, one ounce; Senna Leaves, one drachm; Coriander Seeds, half a drachm; Unrefined Sugar, half an ounce; Boiling Water, eight ounces. Macerate them in a close earthen vessel, which is not glazed with lead, shaking frequently, and after four hours strain the liquor. It may be made also with double or triple the quantity of senna." A similar formula is inserted in the Dublin Pharmacopœia, Cardamom being substituted for coriander seeds.

This combination affords a very pleasant purgative, mild in its operation. The whole quantity may be taken at intervals as a dose. If a more powerful cathartic is indicated, it may be made with an increased proportion of senna. The direction of not infusing the materials in a vessel glazed with lead, ought to be attended to, as the acid of the tamarinds acting on the lead, the infusion might receive a noxious impregnation.

There are some Infusions peculiar to the London and Dublin Pharmacopœias, which may be noticed.

Infusum anthemidis. Infusion of Chamomile. Ph. Lond.

"Take of Flowers of Chamomile, two drachms; Boiling Water, half a pint. Macerate them for ten minutes in a vessel lightly closed, and strain."

Under the form of infusion, chamomile is used as a bitter in dyspepsia: it is more grateful when prepared with cold water, and is then equal perhaps to any other bitter.

INFUSUM ARMORACIÆ COMPOSITUM. Compound Infusion of Horse-Radish. Ph. Lond.

"Take of Horse-Radish Root, fresh and cut, Mustard Seed bruised, of each one ounce; Boiling Water, a pint. Macerate them for two hours in a vessel lightly closed, and strain; then add, of Compound Spirit of Horse-Radish, a fluid ounce."

Under this form the horse-radish may be prescribed in the diseases in which it is employed, more particularly as a stimulant in chronic rheumatism, paralysis, and some forms of dropsy. Its dose is two ounces twice a day.

INFUSUM AURANTII COMPOSITUM. Compound Infusion of Orange-Peel. Ph. Lond.

"Take of dried Rind of the Orange, two drachms; of the fresh Rind of the Lemon, one drachm; of Cloves bruised, half a drachm; Boiling Water, half a pint. Macerate for a quarter of an hour in a vessel lightly closed, and strain."

This affords a bitter, grateful and somewhat pungent, which may be employed with advantage in some forms of dyspepsia. Its dose is two ounces.

INFUSUM COLUMBÆ. Infusion of Colombo. Ph. Lond.

"Take of Colombo Root, cut, one drachm; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

The active matter of colombo is rather imperfectly extracted by water; and this can be regarded only as a bitter infusion, which, like other bitters, may be used in dyspeptic affections. Its dose is two ounces.

INFUSUM CARYOPHYLLORUM. Infusion of Cloves. Ph. L.

"Take of Bruised Cloves, a drachm; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

The aromatic odour and pungency of the clove are extracted in this infusion: it may be used with advantage as a warm and grateful stimulant in some forms of dyspeptic affection, where a sensation of cold and uneasiness is felt at the stomach,—a state which is often produced where the habit of taking spirituous cordials has been indulged in.

INFUSUM CASCARILLÆ. Infusion of Cascarilla. Ph. L.

"Take of Cascarilla Bark bruised, half an ounce; Boiling Water, half a pint. Macerate for two hours in a vessel lightly closed, and strain."

Cascarilla is a substance little valued in modern practice, and there does not appear to be much propriety in the introduction of this infusion as an officinal preparation. Its dose is two ounces.

INFUSUM CUSPARIÆ. Infusion of Angustura. Ph. Lond.

"Take of the Bark of Angustura, bruised, two drachms; Boiling Water, half a pint. Macerate for two hours, in a vessel lightly closed, and strain."

The same remark nearly applies to this preparation, as to the preceding one. Under this form, however, angustura may be occasionally used as a remedy in dyspepsia. The dose is two ounces.

INFUSUM LINI. Infusion of Lintseed. Ph. Lond.

"Take of Lintseed bruised, one ounce; Liquorice Root cut, half an ounce; Boiling Water, two pints. Macerate for four hours, nigh the fire, in a vessel lightly closed, and strain."

The mucilaginous matter of lintseed is very readily dissolved by tepid water; and this forms a demulcent liquor, often taken with advantage in gonorrhœa, dy-

suria, and sometimes in catarrh. It is rendered rather more grateful by the addition of a little lemon juice, and of the rind of the lemon.

INFUSUM QUASSIÆ. Infusion of Quassia. Ph. Lond.

"Take of the wood of Quassia cut, one scruple; Boiling Water, half a pint. Macerate for two hours, in a vessel lightly closed, and strain."

Quassia is a very pure bitter, and its bitterness is extracted by water. Under this form it has been used as a remedy in dyspepsia.

INFUSUM SENNÆ. Infusion of Senna. Ph. Lond.

"Take of Senna leaves, an ounce and a half; Ginger, one drachm; Boiling Water, a pint."

Under this form Senna may be given as a purgative, the dose being three or four ounces. It is however less grateful than the infusion of senna and tamarinds of the Edinburgh Pharmacopœia. The proportion of senna, too, appears to be considerably greater than what is necessary; and there is no propriety in preparing more of the infusion than what is required for a dose. A similar infusion, in which this is avoided, and in which cardamon seeds are substituted for ginger, has a place in the Dublin Pharmacopœia.

INFUSUM SIMAROUBÆ. Infusion of Simarouba. Ph. Lond.

"Take of the Bark of Simarouba bruised, half a drachm; Boiling Water, half a pint. Macerate for two hours, in a vessel lightly closed, and strain."

Simarouba yields its bitterness to water; the infusion, however, is inferior to that of quassia, and does not appear to have any particular advantage to recommend it.

INFUSUM TABACI. Infusion of Tobacco. Ph. Lond.

"Take of the Leaves of Tobacco, one drachm; Boiling Water, a pint. Macerate for an hour, in a vessel lightly closed, and strain."

This infusion is prepared of that strength, proper for giving tobacco under the form of enema, as a narcotic in incarcerated hernia, or to produce evacuation from the intestines, in ileus and obstinate constipation.

INFUSUM MENTHÆ COMPOSITUM. Compound Infusion of Mint. Ph. Dub.

"Take of the Leaves of Spearmint dried, two drachms; Boiling Water as much as is sufficient to form six ounces of infusion when strained. Digest them for half an hour in a covered vessel; strain the liquor when cold, and add to it, of Refined Sugar, two drachms; Oil of Spearmint three drops, dissolved in half an ounce of compound tincture of cardamom"

This is a grateful stomachic, which may be used to obviate flatulence, or to cover the taste of unpleasant medicines.

INFUSUM VALERIANÆ. Infusion of Valerian. Ph. Dub.

"Take of the Root of Valerian, in coarse powder, two drachms; Boiling Water, seven ounces. Digest for an hour, and strain the liquor when it is cold."

Valerian is frequently taken in hysteric affections under the form of infusion, and this will afford a preparation of proper strength. Its dose is from one to two ounces.

CHAPTER VIII.

OF MUCILAGES.

THE term Mucilage, understood as denoting a particular preparation in Pharmacy, is applied to solutions of gummy matter in water, sufficiently concentrated to have a certain degree of viscidity; or to similar solutions

obtained by the maceration of water on vegetables, in which this kind of matter abounds. They are principally employed as vehicles for other substances, either to suspend powders in liquids, to diffuse oils or resinous matter in water, or to give form and tenacity to pills.

MUCILAGO AMYLI. Starch Mucilage. (Mucilago Amyli, *Phar. Lond. Dub.*)

" Take of Starch, half an ounce ; Water, one pound. Rub the starch, with the water gradually added to it, then boil them for a short time.

Starch is the fecula of wheat, and though perfectly insoluble in cold water, is dissolved by boiling water, and forms a gelatinous solution. This starch-mucilage is principally used as a vehicle for giving opium under the form of enema.

MUCILAGO ASTRAGALI TRAGACANTHÆ. Mucilage of Gum Tragacanth. (Mucilag. Gum. Trag. *Ph. Dub.*)

" Take of Gum Tragacanth beat to powder, one ounce ; Boiling Water, eight ounces. Macerate for twenty-four hours, and rub the gum carefully, that it may be dissolved ; then strain through linen." In the Dublin Pharmacopœia, the proportions are two drachms of tragacanth to eight ounces of water.

Tragacanth is not easily dissolved in water, and, even with the aid of heat, the viscid mucilaginous liquor that is formed remains turbid and flocculent. The proportion of the gum to the water is rather large in the Edinburgh Pharmacopœia, but it is designed to form a stiff mucilage, to be used principally in making troches.

MUCILAGO MIMOSÆ NILOTICÆ. Mucilage of Gum Arabic. (Mucilago Acaciæ, *Ph. Lond.*—Mucilago Gum. Arab. *Ph. Dub.*)

" Take of Gum Arabic in powder, one part ; Boiling Water, two parts. Digest with frequent agitation until the gum be dissolved ; then strain through linen."

Mucilage of Gum Arabic is sometimes employed as a demulcent, being the basis of the common pectoral

mixtures used in catarrh. It is more generally used as an agent in Pharmacy, to suspend in water substances insoluble in that liquid, diffuse oils in water, and for similar purposes.

CHAPTER IX.

OF DECOCTIONS.

The power of water as a solvent, is, like that of all other chemical agents, increased by heat. Hence, in general, the active matter of vegetable substances is more completely extracted by boiling them with water, than by mere infusion, either cold or warm, the residuum in the one case being found more inert than in the other.

It is not to be concluded, however, from this fact, that the decoction is proportionally more active. On the contrary, though the water extracts the active matter of the substance, it is often much injured in the operation; in few cases is the decoction equal in power to the quantity of the substance from which it is prepared; in many it is much impaired; and in some it is totally lost, the decoction itself and the residual matter being both nearly inert.

This change is often owing to the dissipation of the volatile principles of the substance operated on. All the essential oils are volatilized at the temperature of boiling water. It is evident, therefore, that substances, whose virtues depend wholly or in part on their essential oil, must be injured by this operation: for this reason, aromatics are always useless additions to decoctions; and the aromatic flavour of many active substances is also lost in this form of preparation.

But there are many cases in which the virtues of medicines are injured by decoction, in which we cannot ascribe the injury to the mere dissipation of their active principles. Opium, bark, and ipecacuan, for instance, are much

weakened by boiling in water; yet, when the operation is conducted in close vessels, so as to collect the water that is evaporated, that water is not found to be strongly impregnated with the active matter of the substance operated on. The distilled water of opium has been given to the extent of six ounces, without exerting any great narcotic effect; and the distilled water of ipecacuan, though it proves emetic, is much less so than the simple infusion Since, then, the active matter is neither to be found in the fluid which is evaporated, nor in that which remains, it is evident that it must have been destroyed in the operation, by decomposition of the principles on which it depended. It is accordingly found that some such change is induced. When a decoction is strained, so as to be obtained transparent, and is subjected anew to boiling, it acquires a deeper colour, becomes turbid, an insipid substance being gradually formed, which is deposited. This change may be owing, either to the re-action of the elements of the vegetable matter being favoured by the humidity, and the high temperature, so that they enter into new combinations, or to the action of the air upon it imparting oxygen. There have been experiments brought in proof of this last circumstance taking place in some cases, especially in the decoction of Peruvian bark, oxygen being absorbed, combining with the extracto-resinous matter, and forming an insipid substance. This in particular is affirmed by Fourcroy. And it is farther rendered probable by the experiments of the younger Saussure, who found that extractive matter, in a humid or dissolved state, exposed to the air, was precipitated after a few days in an insoluble state, and oxygen was absorbed; carbonic acid was also formed; and he concluded, from the results he obtained, that, while part of the carbon of the vegetable matter is abstracted by the action of the oxygen of the air, part also of its oxygen and hydrogen combine and form water, so that the residual matter has an increased proportion of carbon. These changes will be favoured by a high temperature; they are those, therefore, proba-

bly that take place in decoction, and impair or destroy the powers of the vegetable substance ; though it is also possible, that chemical changes may arise from the reaction of the elements of the vegetable matter itself, independent of any action of the air.

From these observations, it is evident, that decoction can seldom be a proper form for the administration of medicines. The pungency and aromatic flavour, on which part of their virtues depends, and which renders them at least more grateful, must always be impaired or lost, and their more important virtues must often be equally injured. It is accordingly a form which is not now often applied to active remedies.

Decoctions, like infusions, are extemporaneous prescriptions. They cannot be kept ready prepared, as in a few days they are injured, and run into the acetous fermentation. They can, however, be prepared much sooner than infusions ; the boiling not requiring to be continued in general for more than ten or fifteen minutes. They ought to be strained while hot, as, on cooling, a portion of the dissolved matter is frequently deposited, which is as active as that which remains dissolved, and this precipitate ought to be mingled with the liquid by agitation, when the dose is to be taken.

Decoctum althææ officinalis. Decoction of Althæa.

"Take of Dried Althæa Root bruised, four ounces ; Raisins freed from their seeds, two ounces ; Water, seven pounds. Boil to five pounds ; put aside the strained liquor until the impurities have subsided, and pour off the clear liquor."

The gummy part of vegetables is less injured by decoction than any other. In this decoction, therefore, all the powers of the althæa root are obtained, and it is under this form that it is used. The decoction is taken as a demulcent, to the extent of two or three pounds in the day, in nephritic complaints, in ardor urinæ, and sometimes in catarrh.

Decoctum anthemidis nobilis, *vulgo Decoctum Chamæmeli sive Commune.* Decoction of Chamomile, *or Common Decoction.*

"Take of the Dried Flowers of Chamomile, one ounce; Caraway seeds bruised, half an ounce; Water, five pounds. Boil for a quarter of an hour, and strain."

This decoction is used only as an enema, and as a fomentation. When applied to the former purpose, the effect it may produce is to be ascribed principally to the water; in the second, the vegetables are not more useful, except as retaining longer the heat and moisture when applied to a part.

There is a similar preparation in the Dublin Pharmacopœia, under the name of Decoctum Chamæmeli Compositum, in which half an ounce of the flowers of chamomile and two drachms of fennel seeds are boiled in a pound of water. It is designed for the same purposes; and as an enema it is rendered more active, in the preparation named Enema Catharticum, by dissolving in ten ounces of it an ounce of manna, and half an ounce of sulphate of magnesia, adding an ounce of olive oil. When to this are added two drachms of tincture of assafœtida, it forms the preparation of the same Pharmacopœia named Enema Foetidum.

Decoctum cinchonæ officinalis, *vulgo Decoctum Corticis Peruviani.* Decoction of Peruvian Bark. (Decoct. Cinchonæ, *Ph. Lond. Dub.*)

"Take of Peruvian Bark in powder, one ounce; Water, one pound and a half. Boil for ten minutes in a covered vessel and strain the liquor while hot."

The resino-extractive matter of Peruvian bark is altered by decoction; hence the reason of the directions given in the Pharmacopœia under this preparation, the boiling not being continued longer than ten minutes, as in this time the active matter, it is supposed, will be as fully extracted as it would be by longer boiling, and the decoction being performed in a covered vessel to exclude as much as possible the access of the air, to the chemical agency of which the change in the

extractive matter has been supposed owing. The liquor is ordered to be strained while hot, as it holds dissolved a larger portion of the resinous matter than it can retain in solution when cold. Hence, after having been strained, it becomes turbid as it cools, depositing a reddish precipitate. This ought to be mixed with it by agitation when the dose is to be taken. The addition of a little acid causes it to remain dissolved, and where this can be prescribed with propriety it may be employed.

Decoction of bark is used in those cases which require the free administration of the remedy, but in which in substance it sits uneasy on the stomach. The dose is two or three ounces, taken as often as the stomach will receive it.

Decoctum daphnes mezerei. Decoction of Mezereon.

"Take of the Bark of the Root of Mezereon, two drachms; of Liquorice Root bruised, half an ounce; Water, three pounds. Boil with a gentle heat to two pounds, and strain."

A compound decoction, prepared from guaiac wood, sarsaparilla, sassafras, mezereon and liquorice, had been highly celebrated, under the name of Lisbon Diet Drink, for its efficacy in the treatment of symptoms connected with syphilis, particularly thickening of the ligaments, affections of the bones and periosteum, and obstinate ulceration. Dr. Russell, from a series of experiments, concluded, that the mezereon is the ingredient on which its activity depends; and this decoction, in which the liquorice serves merely to cover the pungency of the mezereon, has been substituted for the more complicated composition. It is used in the same cases, sometimes also in cutaneous affections, the dose being from four to six ounces twice or thrice a-day. In a large dose, it is liable to excite nausea.

Decoctum geoffrææ inermis. Decoction of Cabbage-Tree Bark.

"Take of Cabbage-Tree Bark in powder, one ounce; Water, two pounds. Boil with a gentle heat to one pound, and strain."

This decoction is the form under which this medicine has been usually administered, the bark in substance being too violent in its operation. In the West India Islands, the decoction has been used as a very effectual remedy in worms, especially the lumbrici. The dose given is two ounces to an adult; if this occasion nausea, griping, or tenesmus, which it sometimes does, these symptoms are relieved by a dose of castor oil. In this country it has not been much employed.

Decoctum guajaci officinalis compositum, *vulgo Decoctum Lignorum.* Compound Decoction of Guaiac.

"Take of Guaiac Wood Shavings, three ounces; Raisins, two ounces; Sassafras Root cut, Liquorice Root bruised, of each one ounce; Water, ten pounds. Boil the water with the guaiac wood and raisins, on a gentle fire, to five pounds, adding the roots towards the end of the boiling; then strain without expression."

This decoction derives its virtues principally from the guaiac. It acts as a diaphoretic, and has been used in cutaneous diseases, and in chronic rheumatism, taken in the quantity of a pound twice or thrice a-day. It has also been employed in the treatment of obstinate venereal symptoms, especially as an auxiliary to mercury.

Decoctum hordei distichi. Decoction of Barley. (Decoct. Hordei, *Ph. Lond. Dub.)*

"Take of Pearl Barley, two ounces; Water, five pounds. First wash off with cold water the flour adhering to the barley; then boil the barley for a short time with about half a pound of water, to extract the colouring matter. This being rejected, put the barley thus purified into five pounds of boiling water. Boil this to one half, and strain."

This decoction is never prepared in the shops. It is, however, very extensively used as a diluent in febrile diseases; and as it is of some importance that it should be grateful, it has been judged proper to give directions how it may be best prepared. Similar directions are given by the London and Dublin Colleges; and they have also inserted another composition, under the name Decoctum Hordei Compositum, in which raisins, figs, and liquorice root are boiled with the barley,—additions which probably render it rather cloying to the taste and stomach, and from which no great advantage can be derived.

Decoctum polygalæ senegæ. Decoction of Seneka. (Decoct. Senegæ, *Ph. Lond.*)

"Take of Seneka Root, one ounce; water, two pounds. Boil to sixteen ounces, and strain."

Under the form of decoction, senega has been employed as an expectorant in pneumonic affections, attended with accumulation of mucus in the bronchiæ, and as a diaphoretic in chronic rheumatism; and though not much used, a formula similar to this has been introduced into the last edition of the London Pharmacopœia. The dose is two or three ounces three or four times a-day.

Decoctum smilacis sarsaparillæ. Decoction of Sarsaparilla. (Decoct. Sarsaparilla, *Ph. Lond. Dub.*)

"Take of Sarsaparilla Root cut, six ounces; Water, eight pounds. Digest for two hours, in a temperature of about 195°, then take out the root and bruise it; put it again into the liquor, and boil it with a gentle fire to two pounds; then express it, and strain."

The fecula, which is the principle in which the power of sarsaparilla resides, is not easily extracted merely by boiling the root. This is the reason of the particular directions to digest the root first, and then bruise it; it is thus softened, and yields its soluble matter more readily in the subsequent boiling. This decoction is the

form under which sarsaparilla is always given, its dose being from a pint to a quart in the course of the day. It has been used in venereal cases, either to promote the action of mercury, or to remove symptoms which have remained after a long continued mercurial course. Dr. Fordyce celebrated its efficacy in very high terms, in giving relief in nocturnal pains, removing eruptions, and as being the best restorative in the emaciation and debility remaining after the long continued use of mercury. Its efficacy in these affections has probably been overated, and the opinion is perhaps more just which regards it only as belonging to the nutrientia, or as a mere demulcent. The benefit sometimes derived from it has perhaps as frequently arisen from the exhibition of mercury too long continued having been suspended, as from any action of the sarsaparilla itself. The decoction has been used with considerable advantage as a demulcent in dysuria and morbid irritability of the bladder, occasioning incontinence of urine.

A few Decoctions, peculiar to the London and Dublin Pharmacopœias, remain to be noticed.

Decoctum aloes compositum. Compound Decoction of Aloes. Pharm. Lond.

"Take of Extract of Liquorice, half an ounce; Subcarbonate of Potash, two scruples; Extract of Aloes, Myrrh in powder, Saffron, of each one drachm; Water, a pint. Boil down to twelve fluid ounces, and strain, then add of Compound Tincture of Cardamoms, four fluid ounces."

The gum resinous substances in this decoction are retained in solution, partly by the solvent power of the water, and partly by the action of the alkali; and by the addition of the spiritous tincture, any spontaneous decomposition will be more effectually prevented. The composition is newly introduced into the Pharmacopœia,

and is said to be analogous to one in use, under the name of Beaume de Vie. It is one which must be very nauseous, and it is not obvious what peculiar advantage can belong to it. As a stimulating aperient, it may be given in the dose of two ounces.

Decoctum cydoniæ. Decoction of Quince Seeds. Pharm. Lond.

"Take of Quince Seeds, two drachms; Water, a pint. Boil with a gentle heat for ten minutes, then strain."

Quince seeds abound with mucilage, which is extracted easily by boiling in water. It is liable to spontaneous decomposition, and having no peculiar advantage is little employed.

Decoctum dulcamaræ. Decoction of Woody Nightshade. Pharm. Lond.

"Take of the Stalks of Woody Nightshake cut, one ounce; Water, a pint and a half. Boil to a pint, and strain."

Under this form the woody nightshade may be employed; but there seems no propriety in giving a formula for its preparation, more than any other vegetable substance, which may be given under the same or any similar form.

Decoctum lichenis. Decoction of Iceland Liverwort. Pharm. Lond. and Dub.

"Take of Liverwort, one ounce; Water, a pint and a half. Boil down to one pint, and strain." In the Dublin Pharmacopœia, a digestion of the water on the lichen for two hours is ordered, and then boiling for a quarter of an hour.

The fecula or mucilage of the lichen is extracted by water by boiling, and it is under this form of decoction that it has been employed as a demulcent, and a mild nutritious substance easy of digestion.

DECOCTUM MALVÆ COMPOSITUM. Compound Decoction of Mallow.

"Take of Mallow dried, one ounce; Chamomile Flowers dried, half an ounce; Water, a pint. Boil them for a quarter of an hour, and strain."

This decoction is designed for the same purpose as the decoction of chamomile, that of serving as a vehicle for fomentations and enemas; and the same observation applies to it.

DECOCTUM PAPAVERIS. Decoction of Poppy. Pharm. Lond.

"Take of the Capsules of the White Poppy cut, four ounces; Water, four pints. Boil for a quarter of an hour, and strain."

The decoction of the capsules of the poppy has been frequently used as an anodyne fomentation, and is now, with propriety, introduced as an officinal preparation.

DECOCTUM QUERCUS. Decoction of Oak Bark. Ph. Lond.

"Take of Oak Bark, one ounce; Water, two pints. Boil down to a pint, and strain."

The astringency of the oak bark is extracted by boiling in water; and the decoction is the common form under which it is used, being applied externally in hæmorrhoids, prolapsus ani, leucorrhœa, and profuse menorrhagia.

DECOCTUM SARSAPARILLÆ COMPOSITUM. Compound Decoction of Sarsaparilla. *Ph. Lond. Dub.*

"Take of the Simple Decoction of Sarsaparilla boiling, four pints; Sassafras Wood cut, Raspings of Guaiac Wood, Liquorice Root bruised, of each one ounce; Mezereon, three drachms. Boil for a quarter of an hour." In the formula of the Dublin Pharmacopœia, the proportion of the mezereon, the active ingredient, is only one drachm to three pints of water.

This is nearly the same composition as the Lisbon Diet Drink, celebrated, as has been already remarked, in the treatment of secondary venereal affections, or

symptoms appearing during a protracted mercurial course. The efficacy of the preparation has been supposed to depend principally on the mezereon, yet the other substances may add something to its power, and it is perhaps preferable to adhere to the original composition of remedies of this kind, so far as this is unexceptionable. Its dose is four or six ounces, three or four times a-day.

Decoctum ulmi. Decoction of Elm. *Ph. Lond. Dub.*

"Take of the Fresh Bark of the Elm bruised, four ounces: Water, four pints. Boil down to two pints, and strain."

This decoction has been recommended in cutaneous eruptions, but is little used. Its dose is four ounces.

Decoctum veratri. Decoction of White Hellebore. Pharm. Lond.

"Take of White Hellebore Root beat, an ounce; Water, two pints; Rectified Spirit, two fluid ounces. Boil the white hellebore root with the water, down to a pint, and strain; when cold, add the spirit."

This decoction is employed as an external application in some cutaneous diseases, principally in psora. It is a much less unpleasant application than the sulphur ointment, and is occasionally successful.

Decoctum digitalis. Decoction of Foxglove. Ph. Dub.

"Take of the Leaves of Foxglove dried, one drachm; Water, as much as may be sufficient to afford eight ounces of the strained decoction. Place the vessel on a gentle fire, and remove it when the liquor begins to boil. Digest for a quarter of an hour, and strain."

Water extracts sufficiently the active matter of the leaves of foxglove by infusion, and there is therefore no necessity for boiling it upon them. The decoction in this preparation is, however, so slight, that it cannot

alter the powers of the medicine, and it may be regarded as analogous to the infusion of the other Pharmacopœias. The proportions too are the same, and it may therefore be given in the same dose.

CHAPTER X.

SYRUPI.—SYRUPS.

Syrups are saturated solutions of sugar in water, in watery infusions, or in vegetable juices. They are seldom very active medicines; and are more commonly employed to render others agreeable, and in pharmacy to communicate peculiar forms.

The proportion of sugar in syrups is generally two parts to one of the fluid; if it is more than this, the solution is disposed to crystalize; if less, it is liable to ferment, and become acescent. Refined sugar ought always to be employed. It is to be melted in the liquid by a gentle heat, and any impurities which collect on its surface when boiling are to be removed. The syrup ought to be kept in a cool place, to prevent the fermentation, which is favoured by a high temperature. The London College have given the general direction of keeping them at a temperature not higher than 55°.

Syrupus simplex *sive communis.* Simple *or Common* Syrup.

"Take of Refined Sugar beat to powder, fifteen parts; Water, eight parts. Dissolve the sugar with a gentle heat, and boil a little so as to form a syrup."

This solution of sugar is used merely to communicate sweetness of taste, or for the pharmaceutical purposes to which syrups are applied.

SYRUPUS ACIDI ACETOSI.

"Take of Acetous Acid (Vinegar,) two pounds and a half; Refined Sugar, three pounds and a half. Boil so as to form a syrup."

This acidulous syrup being sufficiently pleasant, may enter into mixtures in which it cannot occasion any chemical decomposition. It is, however, so rarely employed, that being liable to decomposition on keeping, it is not found in the shops.

SYRUPUS ALTHÆÆ OFFICINALIS. Syrup of Althæa. (Syrup. Althææ, *Ph. Lond.*)

"Take of Fresh Althæa Root cut, one pound; Water, ten pounds; Refined Sugar, four pounds. Boil the water with the root to one half, and expressing it strongly, strain. Put aside the strained liquor, that the impurities may subside, and to the purified liquor add the sugar; then boil it so as to form a syrup.

The water dissolving the mucilage of the Althæa, less than the usual proportion of sugar is required to give it the consistence of a syrup. This mucilage is supposed to give the syrup some demulcent power; this, however, must be very trivial, and it renders it more liable to spontaneous decomposition.

SYRUPUS AMOMI ZINGIBERIS. Syrup of Ginger. (Syrup. Zingib. *Ph. Lond. Dub.*)

"Take of the Root of Ginger beat, three ounces; Boiling Water, four pounds; Refined Sugar, seven pounds and a half. Macerate the root in the water, in a close vessel, for twenty-four hours; and to the strained liquor, add the beat sugar, so as to make a syrup."

This syrup is impregnated with the aromatic flavour and pungency of the ginger, which renders it sufficiently grateful."

Syrupus citri aurantii. Syrup of Orange-Peel. (Syrup. Aurant. *Ph. Lond. Dub.*)

"Take of the Fresh Outer Rind of the Orange, six ounces; Boiling Water, three pounds; Refined Sugar, four pounds. Macerate the rind in water for twelve hours; then to the strained liquor add the sugar beat to powder, and, by the application of a gentle heat, form a syrup."

This syrup, like the former, is used on account of its grateful aromatic flavour. The proportion of sugar in it is too small, especially as it is necessary to avoid any dissipation of the water by boiling, to prevent the loss of the flavour of the orange-peel.

Syrupus citri medicæ, *olim Syrupus Limonum.* Syrup of Lemon. (Syr. Limon. *Ph. Lond. Dub.*)

"Take of the Juice of Lemons strained, after the impurities have subsided, three parts; Refined Sugar, five parts; dissolve the sugar so as to form a syrup."

This is a pleasant syrup, used to sweeten and acidulate mixtures, especially those of the mucilaginous kind: there are others, into the composition of which it cannot properly enter, from the chemical agency of the acid.

Syrupus colchici autumnalis. Syrup of Colchicum.

"Take of the Fresh Root of Colchicum, cut into small pieces, one ounce; Acetous Acid, sixteen ounces; Refined Sugar, twenty-six ounces. Macerate the root in the acid for two days, shaking the vessel occasionally; then expressing it gently, strain it; to the strained liquor add the sugar in powder, and boil a little, so as to form a syrup."

Colchicum has been used under this form as a diuretic in dropsy, the dose being from half an ounce to an ounce. The root itself being little employed in modern practice, this syrup is scarcely ever prescribed.

SYRUPUS DIANTHI CARYOPHILLI. Syrup of Clove July-Flower. (Syr. Caryoph. R. *Ph. Dub.*)

"Take of the Fresh Petals of the Clove July-Flower freed from the heels, one pound; of Boiling Water, four pounds; of Refined Sugar, seven pounds. Macerate the petals in the water for twelve hours; then to the strained liquor add the sugar in powder; which dissolve with a gentle heat, so as to form a syrup.

This syrup derives from the flowers a rich red colour, and an agreeable flavour, and from these qualities is frequently used in mixtures.

SYRUPUS PAPAVERIS SOMNIFERI. Syrup of White Poppy. (Syr. Papav. *Ph. Lond. Dub.*)

"Take of the Dried Capsules of the White Poppy, freed from the seeds, two pounds; Boiling Water, thirty pounds; Refined Sugar, four pounds. Macerate the capsules cut, in the water for twelve hours; then boil until a third part only of the liquor remain; and pressing it strongly, strain; boil down the strained liquor to one half, and again strain; lastly, the sugar being added, boil a little so as to form a syrup."

The active matter of the capsule of the poppy is extracted by water by decoction, and by boiling down the liquor, as directed in this formula, and in those of the other Pharmacopœias, is obtained in a more concentrated state, whether with any diminution of its powers from the continued decoction, has not been ascertained. The syrup has a considerable narcotic power; and the taste being agreeable, and the dose easily regulated, it is convenient for exhibition to children, a drachm being given to a child a year old. From the supposition that it is uncertain in strength, it has been proposed to substitute for it a composition of simple syrup and tincture of opium; but it is not certain if the operation of this is exactly the same, and there is some risk, that from spontaneous decomposition, part of the active matter of the opium may be precipitated.

SYRUPUS RHAMNI CATHARTICI Syrup of Buckthorn. (Syrup. Rhamn. *Ph. Lond.*)

"Take of the Clarified Juice of ripe Buckthorn Berries, two parts; Refined Sugar, one part. Boil, so as to form a syrup."

The juice of the buckthorn is best preserved by being made into a syrup, and it is under this form that it has been used as a cathartic, the dose to an adult being an ounce, or an ounce and a half. Its operation, however, is unpleasant, and the preparation has nothing to recommend it. In the composition of the London Pharmacopœia, ginger and Jamaica pepper are added, which will communicate a pleasant flavour, and may obviate the griping it is liable to produce.

SYRUPUS ROSÆ CENTIFOLIÆ. Syrup of Damask or Pale Rose. (Syrup. Rosæ, *Ph. Lond.*)

"Take of the Fresh Petals of the Damask Rose, one pound; Boiling Water, four pounds; Refined Sugar, three pounds. Macerate the petals in water for twelve hours; then to the strained liquor add the sugar, and boil, so as to form a syrup."

The agreeable flavour of the rose is entirely lost in this syrup; but it has a very weak purgative power, and is sometimes from this quality given to infants in a dose of two or three tea-spoonfuls.

SYRUPUS ROSÆ GALLICÆ. Syrup of Red Rose.

"Take of the Dried Petals of the Red Rose, seven ounces; Boiling water, five pounds; Refined Sugar, six pounds. Macerate the petals in water for twelve hours; then boil them a little, and strain: to the strained liquor add the sugar, and again boil, so as to form a syrup."

Water, by infusion, extracts the slight astringency and the colour of the rose; the astringency has been supposed to be at least such as to counteract the laxative quality of the sugar, and it is usually this syrup that enters into the composition of astringent mixtures.

SYRUPUS SCILLÆ MARITIMÆ. Syrup of Squill.

"Take of the Vinegar of Squill, two pounds; Refined Sugar, three pounds and a half. Dissolve the sugar with a gentle heat, so as to form a syrup."

This is a syrup of considerable power, the active matter of squill being dissolved by vinegar, and being little injured in forming it into a syrup. It is the form under which squill is usually given as an expectorant, in a dose of one or two drachms, and it is often added to combinations of expectorant remedies. It is also given to children as an emetic, especially in pertussis, the operation of it being sometimes promoted by the addition of a little ipecacuan or antimonial wine.

SYRUPUS TOLUIFERÆ BALSAMI, *vulgo Syrupus Balsamicus.* Syrup of Tolu Balsam. (Syrup. Tolut. *Ph. Lond.*)

"Take of Common Syrup, two pounds; Tincture of Tolu Balsam, one ounce. With the syrup newly prepared, and removed from the fire, when it has nearly cooled, mix the tincture gradually with agitation."

This is an economical mode of preparing this syrup; but the old method, still retained in the London Pharmacopœia, of boiling Balsam of Tolu in water in a close vessel, and afterwards forming the liquor into a syrup by the addition of sugar, affords a more grateful composition, the syrup being impregnated with the odour of the balsam, without its resinous matter being diffused through it, which, as prepared by the formula of the Edinburgh College, renders it white and turbid. The syrup is used merely on account of its flavour, and to many this is rather disagreeable. On the supposition of tolu balsam being an expectorant, it sometimes enters into the composition of mixtures used in catarrh.

SYRUPUS VIOLÆ ODORATÆ. Syrup of Violet. (Syrup. Violæ, *Ph. Dub.*)

"Take of the fresh flowers of the Sweet-scented Violet, one pound; Boiling Water, four pounds; Refined Sugar, seven pounds and a half. Macerate the

flowers in water for twenty-four hours in a covered glass or earthen vessel. Then strain, without expression, and to the strained liquor add the beat sugar, so as to form a syrup."

This syrup has a fine blue colour, which is, however, lost on keeping. It is a very gentle laxative, and as such is given to infants in a dose of one or two tea-spoonfuls.

It remains to notice those few syrups which have exclusively a place in the London or Dublin Pharmacopœias.

Syrupus croci. Syrup of Saffron. Ph. Lond.

"Take of Saffron, an ounce; Boiling Water, a pint. Macerate the saffron in the water for twelve hours, in a vessel lightly closed; then strain the liquor, and add the sugar to it."

This syrup is employed in mixtures merely on account of its colour.

Syrupus mori. Syrup of Mulberry. Ph. Lond.

"Take of Mulberry Juice strained, a pint; Refined Sugar, two pounds. Dissolve the sugar in the juice in the manner directed with regard to syrup."

The syrups of several acidulous fruits had formerly a place in the London Pharmacopœia. This is retained as one of the most grateful.

Syrupus Rhoeados. Syrup of Red. Poppy. Ph. Lond. (Syr. Papav. Errat. *Ph. Dub.*)

"Take of the Recent Petals of the Red Poppy, one pound; Boiling Water, a pint and two fluid ounces; Refined Sugar, two pounds and a half. To the water heated by a water-bath, add the petals of the red poppy gradually, stirring them occasionally, then having removed the vessel, macerate for twelve hours; press out the liquor, and put it aside, that the impurities may

subside; lastly, add the sugar in the manner directed with regard to common syrup."

This syrup is valued only on account of the fine red colour which it receives from the petals of the flower.

Syrupus sennæ. Syrup of Senna. *Ph. Lond. Dub.*

"Take of Senna Leaves, one ounce; Bruised Fennel Seeds, one drachm; Manna, Refined Sugar, of each one pound; Boiling Water, one pint. Macerate the senna leaves and the fennel seeds in water for twelve hours. Strain the liquor, and mix with this the manna and sugar." The directions in the Dublin Pharmacopœia are similar, except that the proportion of senna is only half an ounce, and the fennel seeds are omitted.

This is designed as a purgative syrup for children, and will answer this purpose perfectly well; though the infusion of senna, sweetened with sugar, which is in common use, being of extemporaneous preparation, is perhaps preferable.

Syrupus allii. Syrup of Garlic. Ph. Lond.

"Take of the Roots of Garlic, cut, one pound; of Boiling Water, two pounds. Macerate the garlic in the water for twelve hours in a covered vessel, and form a syrup, by adding sugar to the strained liquor."

Garlic has been employed as an expectorant in some forms of catarrh and dyspnœa, under the form of syrup. It has perhaps, however, no such power as to entitle it to a place as an officinal preparation.

Syrupus opii. Syrup of Opium. Ph. Lond.

"Take of the Watery Extract of Opium, eighteen grains; Boiling Water, eight ounces. Macerate them together until the opium be dissolved; then add sugar so as to form a syrup."

This is designed as a substitute for the syrup of poppy; and as the watery extract of opium, not the opium in substance, is dissolved, it may not be liable to the objection of any portion being precipitated from

decomposition. It is not altogether certain, however, whether, in the preparation of the watery extract, (to be afterwards noticed,) the narcotic power of the opium is not impaired, and, therefore, whether this preparation from it will be always of uniform strength. An ounce of the syrup contains about one grain of the watery extract; its strength, therefore, will be similar to the medium strength of the syrup of poppy.

MELLITA.—MEDICATED HONEYS.

Honey has been employed instead of saccharine matter in some pharmaceutical preparations. Combined with vinegar, either alone or with the impregnation of the active matter of vegetables, the kind of composition named Oxymel is formed. Combined merely with infusions of vegetable substances, it forms what are more exclusively named Medicated Honeys. As these preparations have no particular advantage over syrups, and as honey, from idiosyncrasy, produces unpleasant effects on some individuals, they have been rejected by the Edinburgh College. A few, however, retain a place in the London and Dublin Pharmacopœias.

Mel. despumatum. Clarified Honey. Ph. Lond.

"Liquefy honey in a water-bath, then remove the scum."

Honey, as it is expressed from the comb, is liable to contain wax and other impurities. When the honey is liquefied, these, in a great measure, separate and rise to the surface, so as to be easily removed. The honey thus purified is ordered in the other preparations into which honey enters.

Mel. boracis. Honey of Borax. Ph. Lond.

"Take of Borax in powder, a drachm; Clarified Honey, an ounce. Mix them.

In this composition, honey is useful, as giving the proper consistence. It is designed as an application in aphthous affections of the tongue and fauces, the borax giving a sense of coolness, and removing the foul crust.

MEL ROSÆ. Honey of Rose. *Ph. Lond. Dub.*

"Take of the Dried Petals of the Red Rose, four ounces; Boiling Water, three pints; Clarified Honey, five pints. Macerate the petals in the water for six hours, then to the strained liquor add the honey, and boil it down in a water-bath to the proper consistence."

This preparation is similar to the syrup of the red rose, and may be applied to the same purposes.

OXYMEL. Oxymel. *Ph. Lond. Dub.*

"Take of Purified Honey, two pounds; Acetic Acid (Distilled vinegar) one pound. Boil them in a glass vessel, on a slow fire, to the proper consistence."

This has long been in use as a remedy in catarrhal affections, and is also the basis of a cooling detergent gargle.

OXYMEL SCILLÆ. Oxymel of Squill. *Ph. Lond. Dub.*

"Take of Clarified Honey, three pounds; Vinegar of Squill, two pounds. Boil in a glass vessel, over a slow fire, to a proper consistence."

Under this form squill has been employed, principally as an expectorant. Its dose is one or two drachms.

OXYMEL COLCHICI. Oxymel of Colchicum. Ph. Dub.

"Take of the Fresh Root of Colchicum cut into thin slices, one ounce; Distilled Vinegar, one pint; Clarified Honey, two pounds. Macerate the colchicum with the vinegar for two days, in a glass vessel; then strain the liquor pressed out strongly from the root, and add the honey. Lastly, boil the mixture, stirring it frequently with a wooden spoon, to the consistence of a syrup,"

This is essentially the same with the syrup of colchi-

cum already noticed ; nor can it derive any advantage from honey being used in its preparation.

Oxymel Æruginis. Oxymel of Verdigrease. Ph. Dub. (Liniment Æruginis, *Ph. Lond.*)

"Take of Prepared Verdigrease, one ounce ; Vinegar, seven ounces ; Clarified Honey, fourteen ounces. Dissolve the verdigrease in the vinegar, and strain it through linen, then add the honey, and boil the mixture to a proper thickness."

Under this form, verdigrease has been applied as a stimulant and escharotic to foul ulcers.

CHAPTER XI.

VINA.—WINES.

Wine is capable, by infusion, of extracting several of the proximate principles of vegetable substances. From the portion of alcohol it contains, it dissolves in some measure their resin, extract and essential oil ; its watery part dissolves their gum or mucilage ; and being milder and more pleasant to the taste than diluted alcohol, it is sometimes preferred to it as a solvent ; hence Medicated Wines have long been in use, and some of them are still retained in the Pharmacopœias.

It cannot be said however, to be well adapted to this use. Wine itself, when not carefully excluded from the air, is apt to decompose and become acescent ; and, when it holds vegetable matter in solution, it appears to be still more liable to suffer this change. This has been established by the researches of Parmentier ; and the greater number of medicated wines, if kept for any length of time, become medicated vinegars. Now this change may modify the powers of the dissolved matter ; and in some cases, where the wine is taken in a considerable dose, must prove hurtful to the stomach, espe-

cially in dyspeptic affections. Accordingly, few of the medicated wines are now employed. The spontaneous decomposition to which these wines are liable, is sometimes attempted to be obviated by the addition of a portion of alcohol, but this is attended only with imperfect success.

From the tartaric acid which some wines contain, they are capable of acting chemically on some of the metals, and are better solvents of some metallic preparations than water or alcohol.

Vinum aloes socotorinæ, *vulgo Tinctura Sacra.* Wine of Socotorine Aloes. *Sacred Tincture.* (Vinum Aloes, *Ph. Lond. Dub.*)

"Take of Socotorine Aloes, reduced to powder, one ounce; Lesser Cardamom Seeds, Ginger Root, of each bruised, one drachm; Spanish White-Wine, two pounds. Digest for seven days, shaking frequently, and strain." In the Dublin and London Pharmacopœias, the proportion is an ounce of aloes to a pound of the medicated wine; and the solvent is not pure wine, but wine with the addition of a third part of diluted alcohol.

Aloes is entirely soluble in wine; so that in this preparation all its virtues are obtained, and from the presence of the resinous matter of the aloes, it is not liable to decomposition. It is a stimulating cathartic, which has long been in use under the name of Sacred Tincture. It produces its full effect in the dose of one ounce. In a dose of one or two drachms, it is given to excite the action of the intestines and neighbouring organs, in dyspepsia, amenorrhœa and similar affections.

Vinum gentianæ compositum *vulgo Vinum Amarum.* Compound Gentian Wine.

"Take of Gentian Root, half an ounce; Peruvian Bark, one ounce; Orange-Peel dried, two drachms; Canella bark, one drachm; Diluted Alcohol, four ounces; Spanish White-Wine, two pounds and a half. On the root and barks cut and bruised, pour first the diluted alcohol; and after twenty-four hours, add the wine. Then macerate for seven days, and strain."

This wine is designed as a stomachic; and has been regarded as preferable to the tincture of similar composition, as being more mild and grateful, and therefore better for continued use; but from its tendency to become acescent, it is not well adapted to administration in dyspepsia. Its dose is six drachms.

VINUM IPECACUANHÆ. Ipecacuan Wine. (Vinum Ipecacuanhæa, *Ph. Lond. Dub.*)

"Take of Ipecacuan Root bruised, one ounce; Spanish White-Wine, fifteen ounces. Macerate for seven days, and strain through paper."

Wine extracts sufficiently the active matter of ipecacuan, and covers its taste and flavour, while it is less pungent than diluted alcohol. This wine is often used as an emetic, especially to children. Its dose is one ounce to an adult, one drachm to a child a year old.

VINUM NICOTIANÆ TABACI. Tobacco Wine.

"Take of the leaves of Tobacco, one ounce; Spanish White Wine, one pound. Macerate for seven days, and strain through paper."

Under this form, Tobacco has been used as a diuretic in dropsy. The Dose is thirty drops, gradually increased to sixty or eighty twice a-day. It is liable, however, to excite sickness in this large dose, and in a smaller dose often fails in its diuretic effect.

VINUM RHEI PALMATI. Rhubarb Wine.

"Take of the Root of Rhubarb cut, two ounces; Canella Bark bruised, one drachm; Diluted Alcohol, two ounces; Spanish White-Wine, fifteen ounces. Macerate for seven days and strain through paper."

Wine extracts the active matter of rhubarb, and this medicated wine operates as a purgative, in a dose from half an ounce to an ounce. The tincture is in general to be preferred to it, as more uniform, and not liable to decomposition.

VINUM OPII. Wine of Opium. Ph. Lond.

"Take of Extract of Opium, an ounce; Cinnamon Bark bruised, Cloves bruised, each, one drachm; Wine a pint. Macerate for eight days, and strain."

Wine appears to dissolve sufficiently the active matter of opium, and has often been used as a menstruum. With the addition of aromatics, it formed the liquid laudanum of Sydenham, and was at one time an officinal preparation in the Pharmacopœias, though afterwards excluded, to give place to the simple tincture of opium. It is now restored by the London College, as it had still continued in use, and is supposed to have some advantages over the tincture. It is nearly of the same strength. Vinegar impairs the narcotic power of opium, hence if this medicated wine were liable to acescency, it might be regarded as an uncertain preparation, but it is possible that the resino-extractive matter of the opium and the aromatics may counteract any spontaneous decomposition.

VINUM FERRI. Wine of Iron. Ph. Dub.

"Take of Iron Wire in small pieces, four ounces; White Rhenish Wine, four pints. Sprinkle the pieces of iron with a little of the wine, and expose them to the air, until they are covered with rust; then add the remaining wine: digest for seven days, shaking the vessel occasionally, and lastly strain the wine."

The iron being oxidated by the joint action of the wine and the atmospheric air, a portion of the oxide is dissolved by the tartaric acid of the wine. The chalybeate impregnation must, however, be variable, according to the acidity of the wine, and it is therefore perhaps preferable to employ a preparation of more uniform strength.

CHAPTER XII.

ACETA.—VINEGARS.

Vinegar is generally capable of dissolving all those proximate principles of vegetables which are soluble in water, and with regard to some substances its acid appears farther to increase its solvent power. But, at the same time, it very often modifies their medicinal qualities, either by the chemical changes it occasions, or more generally, perhaps, by the action it exerts on the stomach. Hence there is only one medicated vinegar of any importance,—the Vinegar of Squill; the active matter of this root being dissolved by it, and appears to suffer no alteration. The activity of colchicum appears to reside in a similar acrid matter, and it also affords a medicated vinegar; of less importance however, as the colchicum itself is little employed. As a solvent of camphor, the concentrated acetic acid is also used in one preparation.

Acetum aromaticum. Aromatic Vinegar.

"Take of the dried tops of Rosemary; the dried leaves of Sage, of each four ounces; dried Lavender Flowers, two ounces; Cloves, two drachms; distilled Acetous Acid, eight pounds. Macerate for seven days, and strain the expressed liquor through paper."

This is an improved formula for a preparation which has long had a place in the different Pharmacopœias, under the name of Acetum Prophylacticum, as an antiseptic and preservative against the operation of contagion. From the impregnation of the vinegar with the flavour of the aromatic vegetables, it is a grateful perfume, but it is weak, and its odour is very soon impaired.

Acidum acetosum camphoratum. Camphorated Acetous Acid.
(Acid Aceticum Camph. *Ph. Dub.*)

"Take of the stronger Acetous Acid, six ounces; Camphor, half an ounce. Rub the camphor with a little alcohol into powder, which put into the acid, that it may be dissolved."

Camphor is soluble in the concentrated acetic acid, and the solution has an odour highly fragrant and pungent. It has been used as a stimulating perfume, more grateful than the common odoriferous essences. It forms what is named Aromatic Spirit of Vinegar. The preparation of the Pharmacopœia, however, especially that of the Edinburgh College, is inferior in pungency, owing to a weaker acetic acid being employed.

Acetum scillæ maratimæ. Vinegar of Squill. (Acetum Scillæ, *Ph. Lond. Dub.*)

"Take of Squill Root dried, two ounces; distilled Acetous Acid, two pounds and a half; alcohol, three ounces. Macerate the squill with the acetous acid for seven days: express the acid; to which add the alcohol; and when the impurities have subsided, pour off the liquor." The London College order a pound of squill root, recently dried, to six pints of vinegar, and half a pint of proof spirit,—a proportion of it, either unnecessarily large, or which must afford a preparation much stronger than what has been in common use.

Vinegar appears to dissolve completely the active matter of squill, without much impairing its powers: the addition of the alcohol is designed to counteract any spontaneous decomposition to which the vinegar might be liable. Under this form, squill is generally employed as an expectorant, the dose being one drachm; or more usually indeed in the form of the syrup, prepared from this medicated vinegar.

ACETUM COLCHICI. Vinegar of Meadow Saffron. Ph. Lond.

"Take of the fresh Root of Meadow Saffron cut, one ounce; Distilled Vinegar, a pint; Proof Spirit, a fluid ounce. Macerate the root with the vinegar, in a close glass vessel, for twenty-four hours; then press it out, and put it aside, that the impurities may subside; lastly, add the spirit to the clear liquor."

Colchicum bears a considerable resemblance to squill, and its active matter is so far similar, that it appears to be dissolved by vinegar, without its powers being altered. It has been given as a diuretic, either under this form, or made into an oxymel, by the addition of honey; but in modern practice it is little employed.

CHAPTER XIII.

TINCTURÆ.—TINCTURES.

TINCTURES are solutions usually of vegetable, sometimes, however, of animal, and even of mineral substances in spiritous liquors. The solvent may be alcohol either pure, diluted with water, or impregnated with ammonia or ether. Alcohol dissolves the resin, camphor, and essential oil of plants; it is more particularly employed as the menstruum for substances purely resinous, or whose virtues reside in a resin. Where a portion of gum is mingled with the resin, or where tannin or extractive matter is the active principle, diluted alcohol is the proper solvent: it in general dissolves the active matter of all entire vegetable substances, as the bark, leaves, flowers; and wherever it can be properly applied, it is preferable to pure alcohol, as more economical and less pungent. Alcohol, impregnated with ammonia, is employed only in forming tinctures of a few

substances, with the medicinal operation of which, ammonia is supposed to coincide.

Tinctures usually contain the active matter of the substances from which they are prepared, in a more concentrated state than infusions or decoctions, the power of the solvent being greater ; hence they require to be given only in a small dose ; and the power of the solvent, which is otherwise considerable, may be neglected. They have the still more important advantage of not being liable to spontaneous decomposition ; the affinities of the elements of vegetable matter, whence new combinations are established, which are favoured by water, being counteracted by alcohol ; and hence a tincture, if kept secluded from the air, so as to prevent the loss of the alcohol by evaporation, can be preserved any length of time without decomposition.

Tinctures are prepared by infusing the materials in the spirit, without the application of heat. By applying heat, the solvent power is so far promoted, that the impregnation is effected in a shorter time ; but the inactive and grosser matter, it has been supposed, is frequently liable to be extracted, and the high temperature is unnecessary, as, by allowing the solvent to remain a sufficient time (fourteen days usually) on the ingredients, it is fully saturated. Alkaline salts were at one time supposed to increase the solvent power, both of alcohol and diluted alcohol, the tincture being of a much deeper colour when a small portion had been added. But this arises, in part at least, from the action of the alkali on the colouring matter, as the same effect is obtained when they are added to a tincture already prepared ; and even where they increase the solubility of some principles, as of resinous matter, they do not always coincide in medicinal operation with the substance operated on, and they render the tincture more nauseous.

Some tinctures are liable to decomposition on diluting them with water, those especially prepared with pure alcohol, in which resinous matter chiefly is dissolved, the resin being precipitated. Even tinctures prepared with

diluted alcohol are frequently rendered turbid by dilution with water. And it sometimes happens even that a decomposition ensues on mixing a tincture prepared with alcohol with another prepared with diluted alcohol. Such decompositions require to be attended to in their administration, and to be so far obviated, at least when the precipitation is copious, as that by trituration with mucilage the resinous matter shall be diffused.

TINCTURA ALOES SOCOTORINÆ Tincture of Aloes. (Tinct. Aloes, *Ph. Lond. Dub.*)

"Take of Socotorine Aloes in powder, half an ounce; Extract of Liquorice, one ounce and a half; Alcohol, four ounces; Water, one pound. Digest for seven days with a gentle heat in a close vessel, shaking the vessel frequently, and pour off the tincture when clear."

This tincture which has a place in all the Pharmacopœias, is the only one in which the solvent has a still larger proportion of water than the diluted alcohol of the usual strength. It dissolves, however, the aloes sufficiently. The liquorice is designed to cover the taste, which it does very imperfectly. The tincture may be employed as a cathartic in the dose of an ounce, but is seldom used; aloes, from its intense bitterness, being better prescribed under the form of pill.

TINCTURA ALOES ÆTHEREA Ethereal Tincture of Aloes.

"Take of Socotorine Aloes, Myrrh, of each in powder, one ounce and a half; English Saffron, one ounce; Spirit of Sulphuric Ether, one pound. Digest the myrrh with the spirit for four days in a closed phial; then add the saffron and aloes. Digest again for four days; and when the impurities have subsided, pour off the tincture."

If the ingredients of this tincture were digested together, the spirit would be so much saturated with the aloes as to take up little of the myrrh; but by digesting it first on the myrrh, it dissolves a larger quantity of it, and is still capable of dissolving a sufficient proportion of the

aloes and saffron. The spirit of sulphuric ether affords a more grateful tincture than alcohol. A similar preparation has long kept its place in the Pharmacopœias, under the name of Elixir Proprietaris, and has been much used as a stimulant aperient in dyspeptic affections, jaundice and amenorrhœa, given in a dose of one or two drachms. In the dose of six drachms it acts as a cathartic.

Tinctura aloes cum myrrah. Tincture of Aloes and Myrrh. (Tinct. Aloes Comp. *Ph. Lond. et Dub.*)

"Take of Myrrh in powder. two ounces; Alcohol, one pound and a half; Water, half a pound. Mix the alcohol with the water; then add the myrrh; digest for four days; and lastly, add, of Socotorine Aloes, one ounce and a half; English Saffron, one ounce. Digest again for three days, and pour off the pure tincture."

This tincture differs in little from the former, but in the menstruum. Being less grateful, it is used principally externally as an application to bleeding wounds, and a stimulant to foul ulcers.

Tinctura amomi repentis. Tincture of Cardamom. (Tinct. Cardam. *Ph. Lond. et Dub.*)

"Take of Cardamon Seeds, four ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

This tincture is used for its aromatic flavour and pungency; and as these are not considerable, it is but little employed.

Tinctura aristolochiæ serpentariæ. Tincture of Snake-Root. (Tinct. Serpent *Ph. Lond. et Dub.*)

"Take of Virginian Snake-Root bruised, two ounces; Cochineal in powder, one drachm; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

Serpentaria is seldom exhibited under the form of tincture, and it would require indeed to be given in such a dose, that the power of the menstruum would be pre-

dominant. As a grateful bitter, it may be given occasionally in dyspepsia in a dose of two drachms.

TINCTURA BENZOIN COMPOSITA, *vulgo Balsamum Traumaticum.* Compound Tincture of Benzoin. (Tinct. Benzoini Comp. *Ph. Lond. Dub.*)

"Take of Benzoin in powder, three ounces; Balsam of Peru, two ounces; Hepatic Aloes, half an ounce; Alcohol, two pounds. Digest for seven days, and strain through paper." Balsam of Tolu and Storax are substituted in the other Pharmacopœias for the Peru Balsam.

This is used only externally, and principally as an application to recent superficial wounds. It has long been in use under the names of Wade's Balsam and Friar's Balsam. A piece of linen moistened with it generally stops the hæmorrhage from a slight wound, and allows it to heal by the first intention. It is also sometimes applied as a stimulant to foul ulcers.

TINCTURA CAMPHORÆ, *vulgo Spiritus Vinosus Camphoratus.* Tincture of Camphor. (Spirit. Camphor. *Ph. Lond. Dub.*)

"Take of Camphor, one ounce; Alcohol, one pound. Mix, so as to dissolve the camphor. It may be also made with a double or triple proportion of camphor." In the London and Dublin Pharmacopœias, it is prepared of the strength of two ounces to a pint of spirit.

This solution is used externally as a stimulant and anodyne application in chronic rheumatism and spasmodic pains, being rubbed on the part. It is applied in a similar manner to bruises and strains. Linen moistened with it is used as an application to chilblains; and it is sometimes added in small quantity to collyria employed in ophthalmia.

The London College have inserted another solution of camphor in alcohol, impregnated with ammonia, under the name of

LINIMENTUM CAMPHORÆ COMPOSITUM.

"Take of Camphor, two ounces; Water of Ammonia, six ounces; Spirit of Lavender, a pint. Mix the water of

ammonia with the spirit, and distil a pint from a glass retort with a gentle heat. Dissolve the camphor in the distilled liquor."

This liniment is applied te the same uses as the preceding, but the addition of the ammonia renders it more powerful as a stimulant.

TINCTURA CASTOREI. Tincture of Castor. (Tinct. Castor. *Ph. Lond. Dub.*)

"Take of Russian Castor, one ounce and a half; Alcohol, one pound. Digest for seven days, and strain through paper." In the Dublin Pharmacopœia, this tincture is ordered to be prepared with diluted alcohol; but with pure alcohol it is more grateful.

Castor is a substance nearly inert, and this tincture, in which a small quantity of it only is dissolved, can scarcely be supposed to have any medicinal efficacy. It is given sometimes as an antispasmodic, in a dose of from half a drachm to a drachm.

TINCTURA CASTOREI COMPOSITA. Compound Tincture of Castor.

"Take of Russian Castor, one ounce; Assafœtida, half an ounce; Ammoniated Alcohol, one pound. Digest for seven days, and strain through paper."

This tincture, which has a place only in the Edinburgh Pharmacopœia, is rather more active than the former, from the addition of the assafœtida and the ammonia. It is given in hysteria in the dose of a drachm.

TINCTURA CINCHONÆ OFFICINALIS. Tincture of Peruvian Bark. (Tinct. Cinchona, *Ph. Lond. Dub.*)

"Take of Peruvian Bark in powder, four ounces; Diluted Alcohol, two pounds and half. Digest for seven days, and strain through paper." In the formula of the London College, seven ounces of bark are ordered to two pints of proof spirit, whether with the effect of rendering the tincture much stronger may be considered as doubtful.

The active matter of bark is extracted by diluted alco-

hol, but so sparingly, that it may be doubted whether in the tincture the powers of the menstruum are not greater than those of the bark. It can therefore never be employed where large quantities of cinchona are required. It is used only as a bitter in dyspepsia, occasionally, in a dose of two drachms, and for this purpose the compound tincture of bark, to be afterwards noticed, is preferable.

Tinctura cinnamoni composita *olim Tinctura Aromatica.* Compound Tincture of Cinnamon, formerly Aromatic Tincture. (Tinct. Cinnam Comp *Ph. Lond. Dub.*)

"Take of Cinnamon Bark bruised, Cardamon Seeds bruised, each one ounce; Long Pepper in powder, two drachms; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain."

This is a grateful aromatic tincture, seldom used by itself, but frequently added to other tinctures, or to mixtures, to communicate flavour and pungency. It is thus often used in combination with bitters and astringents.

Tinctura colombæ. Tincture of Colombo. (Tinct. Colomb. *Ph. Lond. Dub.*)

"Take of the Root of Colombo in powder, two ounces; Diluted Alcohol, two pounds. Digest for seven days, and strain through paper."

Colombo does not appear to yield its active matter very readily, at least this tincture is not strong, and cannot be employed for any of the more important purposes for which this root is prescribed. It is used indeed merely as a bitter tincture in dyspepsia, in a dose of three or four drachms.

Tinctura convolvuli jalapæ. Tincture of Jalap. (Tinct. Jalap. *Ph. Lond. Dub.*)

"Take of the Root of Jalap in powder, three ounces; Diluted Alcohol, fifteen ounces. Digest for seven days, and strain through paper."

The activity of jalap resides in a resinous matter, which in this tincture is extracted along with a portion of mucilage. It may be given as a cathartic, in a dose of

four or six drachms. Jalap, however, is usually rather given in substance, and scarcely ever under this form.

Tinctura croci. Tincture of Saffron. (Tinct. Croci, *Ph. Dub.*)

"Take of English Saffron, one ounce; Diluted Alcohol, fifteen ounces. Digest for seven days, and strain through paper."

This tincture is to be valued only for its colour.

Tinctura digitalis purpureæ. Tincture of Foxglove. (Tinct. Digital. *Ph. Lond. Dub.*)

"Take of the dried Leaves of Foxglove, one ounce; Diluted Alcohol, eight ounces. Digest for seven days, and strain through paper." In the preparation of this very active and important tincture, the same proportions are ordered in all the Pharmacopœias.

Tincture of Foxglove has been supposed to be the form under which the operation of this plant as a narcotic is best obtained, and it is with this view that it has been introduced: it has also the important advantages, that it can be kept without the powers of the digitalis being impaired, and that its dose is easily regulated. The usual dose is ten drops, which, according to the general rules observed in the administration of digitalis, is to be continued until its effects are obtained.

Tinctura ferulæ assafoetidæ. Tincture of Assafœtida. (Tinct. Assafœtid. *Ph. Lond. Dub.*)

"Take of Assafœtida, four ounces; Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

Alcohol being the solvent in this tincture, it is a solution chiefly of the resinous part of the assafœtida, and it is more grateful than when made with proof spirit. The Dublin College order a menstruum, composed of two pints of rectified spirit, and eight ounces of water. As a remedy in tympanitis and hysteria, it is sometimes given in a dose of one drachm; but in any quantity in which it can be given, so that the operation of the solvent shall not be predominant, its effects must be extremely trivial.

Tinctura gentianæ composita, *vulgo Elixir Stomachicum.* Compound Tincture of Gentian. (Tinct. Gentian. Comp. *Ph. Lond. Dub.*)

"Take of Gentian Root, two ounces; dried Orange Peel, one once; Canella Bark, half an ounce; Cochineal, half a drachm; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

In this tincture, the bitterness of the gentian is completely extracted, and it is rendered more grateful by the aromatic quality of the orange peel and canella. It is used as a stomachic in a dose of two or three drachms, in cases where the stomach is disordered from any occasional cause. In more permanent forms of dyspepsia, it cannot be employed with equal advantage, and the continued use of tinctures of this kind ought always, as Cullen remarked, to be avoided, as being liable to accustom the stomach to the stimulus of ardent spirit.

Tinctura guajaci. Tincture of Guaiac. (Tinct. Guaiac, *Ph. Lond. Dub.*)

"Take of the Resin of Guaiac, one pound; Alcohol, two pounds and a half. Digest for seven days and strain through paper."

The proportion of guaiac to the solvent of this tincture, is unnecessarily large. Only half a pound in the London Pharmacopœia, and four ounces in the Dublin Pharmacopœia, are ordered to two pints of alcohol.

This tincture may be given in a dose of two or three drachms, but it is inferior in activity to the one which follows.

Tinctura guajaci ammoniata. Ammoniated Tincture of Guaiac. (Tinct. Guaiac. Amm. *Ph. Lond. Dub.*)

"Take of the Resin of Guaiac, four ounces; Ammoniated Alcohol, one pound and a half. Digest for seven days, and strain through paper."

As the ammonia coincides with the guaiac as a stimulant and diaphoretic, this affords a preparation of more efficacy, it is supposed, than the simple tincture, and it

is more frequently employed. It is given in chronic rheumatism, in a dose of from one to two drachms.

TINCTURA HELLEBORI NIGRI. Tincture of Black Hellebore. (Tinct. Helleb. Nig. *Ph. Lond. Dub.*)

"Take of black Hellebore Root bruised, four ounces; Cochineal, half a drachm; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

It was under the form of this tincture that black hellebore was celebrated by Mead as an emmenagogue, in a dose of one drachm. Cullen remarks with regard to it, that he had never found it successful, and it is now little used.

TINCTURA HYOSCYAMI NIGRI. Tincture of Black Henbane. (Tinct. Hyoscyam. *Ph. Lond. Dub.*)

"Take of the Dried Leaves of Black Henbane, one ounce; Diluted Alcohol, eight ounces. Digest for seven days, and strain through paper."

Henbane has been introduced in modern practice as a substitute for opium in particular cases, already pointed out under its history. The inspissated juice being liable to be variable in strength, the tincture has been employed, and has now a place in all the Pharmacopœias, nearly of the same strength. Its dose has been stated to be twenty-five drops, but in general not much effect is obtained from it under a dose of half a drachm.

TINCTURA KINO. Tincture of Kino. (Tinct. Kino, *Ph. Lond. Dub.*)

"Take of Kino, two ounces; Diluted Alcohol, one pound and a half."

Kino consists principally of tannin; it is entirely soluble in diluted alcohol. The dose of this tincture is from half a drachm to a drachm.

TINCTURA LAURI CINNAMOMI. Tincture of Cinnamon. (Tinct. Cinnamom, *Ph. Lond. Dub.*)

"Take of Cinnamon Bark bruised, three ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

The diluted alcohol is impregnated with the aromatic flavour of the cinnamon, and it is merely as possessing this flavour that this tincture is used in mixtures.

TINCTURA MELOES VESICATORII, *vulgo Tinctura Cantharidum.* Tincture of Cantharides. (Tinct. Cantharid. *Ph. Dub.*—Tinct. Lyttæ, *Ph. Lond.*)

"Take of Cantharides bruised, one drachm; Diluted Alcohol, one pound. Digest for seven days, and strain through paper."

Diluted alcohol extracts and holds dissolved the acrid matter of cantharides, and it is under this form that this substance has been generally employed internally, being more manageable in its dose than it is in powder. It has been given as a diuretic in dropsy, and as a remedy in incontinence of urine, gleet, leucorrhœa, and some cutaneous diseases. Its dose is from ten to twenty drops, increased gradually until some sensible operation is produced. Dr. C. Smith has remarked, however, that in ischuria arising from debility of the coats of the bladder, he had found little advantage derived from the tincture, while in substance the cantharides had been successful. The tincture is also employed externally as a rubefacient.

TINCTURA MIMOSÆ CATECHU, *olim Tinctura Japonica.* Tincture of Catechu. (Tinct. Catechu, *Ph. Lond. Dub.*)

"Take of Catechu, three ounces; Bark of Cinnamon, two ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

Catechu, consisting almost entirely of tannin and extractive matter is dissolved by diluted alcohol, and in this tincture it is rendered more grateful by the cinnamon. It is given in a dose of one drachm, as an astringent.

TINCTURA MYRRHÆ. Tincture of Myrrh. (Tinct. Myrrhæ, *Ph. Lond. Dub.*)

"Take of Myrrh in powder, three ounces; Alcohol, twenty ounces; Water, ten ounces. Digest for ten days, and strain through paper."

Myrrh being principally resinous, is not entirely soluble in common proof spirit, and therefore alcohol less diluted is employed for its solution. The tincture is used principally as an external stimulant and antiseptic application, more especially in affections of the teeth and gums.

TINCTURA OPII, *sive Thebaica; vulgo, Laudanum liquidum.* Tincture of Opium. (Tinct. Opii, *Ph. Lond. Dub.*)

"Take of Opium, two ounces; Diluted Alcohol, two pounds. Digest for seven days, and strain through paper."

In this tincture all the active matter of opium is dissolved, the residuum being impurities or insoluble matter, and a given quantity of the tincture having been found to produce the same effects on the system nearly as the quantity of opium, which, by calculation, it contained, ought to have done, allowance being made for the undissolved matter. The proportion of opium to each drachm of the tincture is five grains, but by evaporation it is found to yield only three grains and a half; twenty-five drops is supposed to be equal in power to one grain of solid opium, and is the dose commonly given to a person not accustomed to it. It is of the same strength as ordered in the different Pharmacopœias.

Laudanum, as this tincture is named, is given in all the cases in which opium is usually administered, and is preferred to it as being more speedy in its operation, more manageable in its dose, and more convenient for combination with other remedies. Where the stomach is in an irritable state, so as to be easily excited to vomiting, or where the operation of the opium is wished to be exerted more slowly, or more peculiarly on the intestinal canal as in diarrhœa and spasmodic colic, it is given in

the solid state, and usually in the form of pill. Externally the tincture is occasionally applied locally as a stimulant and anodyne.

TINCTURA OPII AMMONIATA; *olim, Elixir Paregoricum.* Ammoniated Tincture of Opium.

"Take of Benzoic Acid, English Saffron, of each three drachms; Opium, two drachms; Volatile Oil of Anise, half a drachm; Ammoniated Alcohol, sixteen ounces. Digest for seven days in a shut phial, and strain through paper."

This formula is designed as the improvement of a preparation which has long been medicinally employed under the name of Paregoric Elixir, and which, as a weak and pleasant opiate, has in particular been much used as a remedy in catarrh. The formula, however, is but ill contrived. While the ammonia can add nothing to the efficacy of the preparation, its pungency renders it extremely ungrateful; and the tincture approaches too nearly in strength to the common tincture of opium. The Paregoric Elixir of the London Pharmacopœia, and which has now also a place in the Dublin Pharmacopœia, (Tinct. Opii Camphorata, to be afterwards noticed,) is better adapted to the purposes for which it is designed, and is generally preferred. The composition of the Edinburgh College contains a grain of opium in a drachm, and this is its medium dose. The other does not contain more than a grain in half an ounce.

The operation of the opium cannot be much influenced by the substances with which it is combined in this formula. The common application of it is as a remedy in catarrhal affections. Its dose is from half a drachm to a drachm, sometimes two drachms, taken generally at bedtime.

TINCTURA RHEI PALMATI. Tincture of Rhubarb. (Tinct. Rhei, *Ph Lond. Dub.*)

"Take of the Root of Rhubarb, three ounces; Lesser Cardamom Seeds, half an ounce; Diluted Alcohol, two

pounds and a half. Digest for seven days, and strain through paper."

Proof spirit extracts nearly all the active matter of rhubarb, and this tincture therefore has all its powers. It is sometimes prescribed in dyspeptic affections and in diarrhœa, in a dose from half an ounce to an ounce. The tincture of the Dublin Pharmacopœia has the addition of a little liquorice and saffron.

TINCTURA RHEI ET ALOES; *olim, Elixir Sacrum.* Tincture of Rhubarb with Aloes.

"Take of the Root of Rhubarb cut, ten drachms; Socotorine Aloes, six drachms in powder; Lesser Cardamom Seeds bruised, half an ounce; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

The cathartic power of the rhubarb is in this tincture increased by combination with the aloes. It is employed as a stimulating aperient and purgative, in a dose from half an ounce to an ounce, frequently also as an emmenagogue.

TINCTURA RHEI ET GENTIANÆ; *olim, Tinctura Rhei Amara.* Tincture of Rhubarb with Gentian.

"Take of Root of Rhubarb, two ounces; Gentian Root, half an ounce; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

This combination of gentian with rhubarb is supposed to render it a more useful remedy in dyspeptic cases; but the power of the one is so inconsiderable, compared with that of the other, that no important advantage is gained from it. Its dose is from two to four drachms.

TINCTURA SAPONIS. *vulgo Linimentum Saponaceum.* Tincture of Soap. (Liniment. Sapon. *Ph. Lond. Dub.*)

"Take of Soap, four ounces; Camphor, two ounces; Volatile Oil of Rosemary, half an ounce; Alcohol, two pounds. Digest the soap in the alcohol for three days; then add the camphor and oil to the strained liquor, agitating it." There is a similar composition in the London

and Dublin Pharmacopœias, under the name of Linimentum Saponis Compositum, three ounces of hard soap and one ounce of camphor being dissolved in a pint of spirit of rosemary.

This is a stimulant of considerable efficacy, used as an external application, by friction, in strains and rheumatic pains.

Tinctura saponis cum opio; *olim, Linimentum Anodynum.* Tincture of Soap with Opium.

"This is made in the same manner, and from the same ingredients, as the tincture of soap; only adding at first one ounce of opium."

It is used for the same purposes as the preceding tincture, and likewise as an anodyne in rheumatism and spasms of the muscles. It is frequently successful in relieving pain by topical application, though the relief is often only temporary.

Tinctura sennæ composita, *olim Elixir Salutis.* Tincture of Senna. (Tinct. Sennæ, *Ph. Lond. Dub.*)

"Take of the Leaves of Senna, two ounces; Root of Jalap, one ounce; Coriander Seeds, half an ounce; Diluted Alcohol, three pounds and a half. Digest for seven days, and to the tincture strained through paper add four ounces of Refined Sugar."

This forms a very excellent purgative tincture, less unpleasant in its taste than any of the other cathartic tinctures, not liable therefore to excite nausea, and at the same time operating sufficiently well. Its dose is one ounce or ten drachms. In the London and Dublin Pharmacopœias it is prepared without the jalap, and is therefore less active.

Tinctura toluiferæ balsami; *olim, Tinctura Tolutana.* Tincture of Tolu Balsam. (Tinct. Bals. Tolut. *Ph. Dub.*)

"Take of Balsam of Tolu, one ounce and a half; Alcohol, one pound. Digest until the balsam is dissolved, and strain through paper."

The tolu balsam is entirely soluble in alcohol; but as

it is a substance of no activity, this tincture is scarcely used but on account of its flavour, and for making the syrup of tolu.

TINCTURA VERATRI ALBI. Tincture of White Hellebore.

"Take of White Hellebore Root, eight ounces; Diluted Alcohol, two pounds and a half. Digest for seven days, and strain through paper."

White hellebore is a medicine perhaps never prescribed internally, its operation is so violent. The dose of this tincture cannot exceed a few drops. Neither is it used as an external application.

THE following are the Tinctures peculiar to the London and Dublin Pharmacopœias.

TINCTURA AURANTII, Tincture of Orange Peel. *Ph. Lond. Dub.*

"Take of Fresh Orange Peel, three ounces; Proof Spirit, two pints. Digest for three days, and strain."

The alcohol is in this tincture impregnated with the flavour and bitterness of the orange peel, and it may be used as communicating flavour, or in combination with more powerful bitters.

TINCTURA CAMPHORÆ COMPOSITA. Ph. Lond.

"Take of Camphor, two scruples; Hard Opium in powder, Acid of Benzoin, of each one drachm; Proof Spirit, two pints. Macerate for fourteen days, and strain." The same composition, with the addition of a drachm of Essential Oil of Anise, (which used also to be an ingredient in the above formula, but has been left out, as its flavour is rather disagreeable,) has a place in the Dublin Pharmacopœia, under the name of Tinctura Opii Camphorata.

This is the tincture which has been known under the name of Paregoric Elixir, and is in common use as a pleasant opiate in catarrh, two tea-spoonfuls being taken

at bed-time. Half an ounce of it contains a grain of opium. It is therefore inferior in strength, but less harsh and stimulating, as has been already remarked, than the tincture which has a place in the Edinburgh Pharmacopœia, under the same popular name of Paregoric Elixir. The London College have given it its present name, rather than the former one, of Tinctura Opii Camphorata, to lessen the risk of its being confounded with Tincture of Opium, in prescribing it.

TINCTURA CAPSICI. Tincture of Capsicum. Ph. Lond.

"Take of Capsicum Berries, an ounce; Proof Spirit, two pints. Macerate for fourteen days, and strain."

Under this form capsicum may be employed as a stimulant and stomachic; and diluted, it may afford an easy mode of forming the capsicum gargle.

TINCTURA CARDAMOMI COMPOSITA. Compound Tincture of Cardamon. *Ph. Lond. Dub.*

"Take of Cardamom Seeds, Carraway Seeds, Cochineal, of each beat to powder, two drachms; Cinnamon Bark bruised, half an ounce; Raisins freed from the stones, four ounces; Proof Spirit, two pints. Macerate for fourteen days, and strain."

There is a similar composition under the same name in the Dublin Pharmacopœia, the raisins being omitted. With this omission, it is nearly the same with the Compound Tincture of Cinnamon of the Edinburgh Pharmacopœia, and may be applied to the same uses.

TINCTURA CASCARILLÆ. Tincture of Cascarilla. *Ph. Lond. Dub.*

"Take of Cascarilla Bark, four ounces; Proof Spirit, two pints. Macerate for fourteen days, and strain."

Cascarilla is so little employed in modern practice, that there is scarcely any advantage in having its tincture as an officinal preparation.

TINCTURA CINCHONÆ COMPOSITA, Compound Tincture of Peruvian Bark. *Ph. Lond. Dub.*

"Take of Pale Peruvian Bark beat to powder, two ounces; Dried Orange Peel, an ounce and a half. Vir-

ginian Snake-Root bruised, three drachms; Saffron, one drachm; Cochineal, two scruples; Proof Spirit, twenty fluid ounces. Macerate for fourteen days, and strain."

This is the composition which has been known under the name of Huxham's Tincture of Bark. It is more grateful than the simple tincture, and, from the substances added to the cinchona, is probably a better stomachic. It is principally in dyspeptic affections that it is employed, in a dose of two drachms taken occasionally.

Tinctura humuli. Tincture of Hop.

"Take of Hops, five ounces; Proof Spirit, two pints. Macerate for fourteen days, and strain."

Hop having been introduced as a narcotic, the tincture affords a convenient form for its administration. It has been supposed to be nearly of the same strength as tincture of opium, but it requires in general to be given in a dose of from half a drachm to a drachm, to produce much sensible effect.

Tinctura rhei composita. Compound Tincture of Rhubarb. Pharm. Lond.

"Take of Root of Rhubarb cut, two ounces; Liquorice root bruised, half an ounce; Ginger Root cut, Saffron, of each two drachms; Water, a pint; Proof Spirit, twelve fluid ounces. Macerate for fourteen days, and strain."

The principle in which the purgative quality of rhubarb resides, has been supposed to be more completely dissolved by water than by other solvents; hence from the large proportion of water in this tincture, it is supposed this quality will be obtained more completely; while the proportion of alcohol will prevent spontaneous decomposition. Its medium dose as a purgative is an ounce.

Tinctura scillæ. Tincture of Squill. *Ph. Lond. Dub.*

"Take of Squill Root, recently dried, four ounces; Proof Spirit, two pints. Digest for fourteen days, and strain."

Squill, when employed as a diuretic, operates most effectually in substance: as an emetic or expectorant it is given under the form of the vinegar or syrup, the vinegar correcting its nauseous taste. It is not apparent what particular advantage is to be derived from a tincture of it,—a preparation in which the acrimony of the squill must be very imperfectly covered. The dose of this tincture is from twenty to sixty drops.

TINCTURA VALERIANÆ. Tincture of Valerian. *Ph Lond. Dub.*

"Take of Valerian Root, four ounces; Proof Spirit, two pints. Digest with a gentle heat for fourteen days, and strain."

The active matter of valerian is sufficiently extracted by diluted alcohol. The powers of the menstruum probably however exceed those of the dissolved matter, and hence this tincture cannot be employed with much advantage.

TINCTURA VALERIANÆ AMMONIATA. Ammoniated Tincture of Valerian. *Ph. Lond. Dub.*

"Take of Valerian Root, four ounces; Aromatic Spirit of Ammonia, two pints. Digest for fourteen days and strain."

This tincture may be more powerful than the preceding, from the impregnation of ammonia. It is employed in hysterical affections. Its dose is from one to two drachms.

TINCTURA ZINGIBERIS. Tincture of Ginger. *Ph. Lond. Dub.*

"Take of Ginger, two ounces; Proof Spirit, two pints. Macerate for fourteen days, and strain."

This tincture contains the pungency of the ginger, and may be used as an aromatic to conceal the flavour and taste, or promote the operation of other remedies. To obviate flatulence, ginger is generally taken in substance.

TINCTURA ANGUSTURA. Tincture of Angustura. Ph. Dub.

"Take of the Bark of Angustura in coarse powder, two ounces; Proof Spirit, two pints. Digest for seven days, then strain the tincture."

Diluted alcohol dissolves the active matter of angustura; and under this form it has been sometimes given in dyspepsia, in a dose of two drachms occasionally.

TINCTURA GALBANI. Tincture of Galbanum. Ph. Dub.

"Take of Galbanum in small pieces, two ounces: Proof Spirit, two pints. Digest them for seven days; then strain the tincture."

This tincture has sometimes been used in hysteria, to obviate flatulence, in a dose of two to three drachms. It can scarcely be supposed to have any power.

TINCTURA MOSCHI. Tincture of Musk. Ph. Dub.

"Take of Musk, two drachms; Rectified Spirit, one pint. Digest for seven days, and strain the tincture."

This tincture can be employed only to communicate the odour of musk, and is therefore of little importance.

TINCTURA QUASSIÆ. Tincture of Quassia. Ph. Dub.

"Take of the Wood of Quassia rasped, one ounce; Proof Spirit, two pints. Digest for seven days; then strain the tincture."

The bitterness of quassia may be sufficiently extracted in this preparation. These bitter tinctures appear, however, to be unnecessarily multiplied in the Pharmacopœias, especially as from the action of the menstruum on the stomach, the form of tincture is not the best for the administration of this class of remedies.

CHAPTER XIV.

EXTRACTA.—EXTRACTS.

EXTRACTS are preparations obtained by digesting or boiling vegetable substances in water, alcohol, or proof spirit. The menstruum dissolves the active matter of the vegetable; the tincture or decoction is strained, and is

evaporated until a mass of a stiff consistence is obtained. This is named an Extract, and either a watery or spiritous extract, as water or alcohol has been employed as the menstruum. If water has been used, the mucilage, extract, tannin, saccharine, and saline parts of the vegetable remain in the extract; if alcohol, the resin is its principal component part; and if proof spirit, all the fixed principles which water and alcohol are separately capable of dissolving, are obtained.

It is evident, therefore, that the same mode of preparing these extracts, is not applicable to every vegetable substance. Where the virtues depend principally on the extract or tannin which the substance contains, the watery extract will be proper; while, if it depend on a resinous part, the spiritous extract only will possess its virtues.

It is to be observed, however, that in the preparation of these extracts, the virtues of the substances are almost always injured to a certain extent. The essential oil, on which their flavour and aromatic quality depend, are dissipated; and in the preparation of the watery extracts, there is generally a partial decomposition of the active matter, by the necessary decoction. This preparation, therefore, is not now very frequently employed; and with the exception of some of the pure bitters, as gentian, or some of the saccharine vegetables, as liquorice, there is no medicine, perhaps, but what may be given with more advantage under some other form.

The Edinburgh and Dublin Colleges preserve the distinction of watery and spiritous extracts: the London College do not observe it; and they have farther associated, with what are more strictly named extracts, the inspissated juices of vegetables, the consistence of these being similar; and the only circumstance in which they differ, that in the one the matter naturally dissolved in the juice of the plant, in the other, the matter extracted by the operation of a solvent is obtained, is not, it has been conceived, sufficiently important to constitute a distinction between them. I have adhered, however, to the arrangement of the Edinburgh Pharmacopœia, and under the

chapter of Inspissated Juices have already introduced those which are peculiar to the London Pharmacopœia.

I.—*Extracta per Aquam.—Extracts by Water.*

The directions for preparing these are given in the Edinburgh Pharmacopœia, under the Extract of Gentian. The directions in the other Pharmacopœias are essentially the same, a common water-bath being ordered for the inspissation; the extract being stirred constantly as it becomes thick, and when prepared being kept with a little alcohol sprinkled on the surface.

Extractum gentianæ luteæ. Extract of Gentian. (Extr. Gent. *Ph. Lond. Dub.*)

" Take of Gentian Root, any quantity. Having cut and bruised it, add eight times its weight of Distilled Water. Boil to one half, and strain, expressing the liquor strongly. Reduce it immediately to the consistence of thick honey, by evaporation in a bath, of boiling water saturated with muriate of soda."

This extract is intensely bitter, the quality of bitterness appearing in general not to be injured by the operation of decoction or evaporation It is generally used to form other medicines into pills, particularly those with which it coincides in medicinal virtues, as tonics and emmenagogues.

In the same manner are prepared the following Extracts :

Extractum florum anthemidis nobilis. Extract of Chamomile. (Extr. Anthem. *Ph. Lond.*—Extr. Chamom. *Ph. Dub.*)

The bitterness of Chamomile is rendered rather ungrateful in its infusion, by the flavonr of its essential oil. This is entirely dissipated by decoction, and the extract is, therefore, a pure and grateful bitter. It is scarcely applied, however, to any use.

EXTRACTUM FOLIORUM CASSIÆ SENNÆ. Extract of Senna.

Senna has its activity much impaired by decoction. The extract, therefore, besides that it has no particular advantage, cannot be regarded as a proper preparation of it, and it is accordingly found not to be more powerful than the leaf in substance.

EXTRACTUM RADICIS GLYCYRRHIZÆ GLABRÆ. Extract of Liquorice Root. (Extr. Glycyrrh. *Ph. Lond. Dub.*)

The active matter of this root consists chiefly of mucilage and saccharine matter, and suffers therefore little injury in this preparation. The extract is seldom prepared in the shops but on a large scale ; and this extract of commerce is usually in an impure state. In some of the foreign Pharmacopœias, it is purified by solution in water, straining, and a new evaporation ; and an extract either prepared in this way, or directly from the root itself, due care being taken in its preparation so as to have it pure, is now sold under the name of Refined Liquorice. It is evaporated so as to be perfectly hard, and is in common use as a demulcent in catarrh, being allowed to dissolve slowly in the mouth.

EXTRACTUM LIGNI HÆMATOXYLI CAMPECHENSIS. Extract of Logwood. (Extr. Hæmatoxyl. *Ph. Lond. Dub.*)

The astringency of the logwood is obtained with no sensible injury in this extract. It has been proposed to be employed as an astringent, in a dose from ten to twenty grains, but has never been established in use.

EXTRACTUM RADICIS HELLEBORI NIGRI. Extract of Black Hellebore Root. (Extr. Helleb. N. *Ph. Dub.*)

The aqueous extract of this root is comparatively mild in its operation, and is even said to be milder than the root itself. In a dose from ten to twenty grains, it operates as a cathartic, and has been employed as such in mania, and in a smaller dose, as an emmenagogue, but its uniformity of operation cannot be depended on. The spiritous extract, which has a place in some of the

foreign Pharmacopœias, is a more active medicine. It has been used as a hydragogue cathartic, and is the basis of Baccher's tonic pills, once highly celebrated in the treatment of dropsy.

Extractum capitum papaveris somniferi. Extract of Poppy. (Extract. Papav. *Ph. Lond.*)

This extract from the capsule of the popy retains its narcotic quality to a certain extent. It is, however, so far injured, that the extract is not uniform in strength, and is therefore little used. Sometimes it is employed in making the syrup of poppy, a drachm of it being dissolved in a pound of water, and boiled with a pound of sugar.

Extractum foliorum rutæ graveolentis. Extract of Rue. (Extr. Rutæ, *Ph. Dub.*)

As the virtues of Rue reside chiefly, if not entirely, in its essential oil, this extract must be regarded as an injudicious preparation. It is intended for administration in amenorrhœa, its dose being from ten to fifteen grains; but it has probably no power.

The following watery extracts have a place in the Dublin or London Pharmacopœia.

Extractum aloes. Extract of Aloes. Ph. Lond.

" Take of Socotorine Aloes in powder, half a pound; Boiling Water, four pints, Macerate for three days with a gentle heat; then strain, and put the liquor aside, that the impurities may subside. Pour off the purified liquor, and evaporate, until it attain a proper consistence."

The object of this preparation is not so much to separate the aloes from any impurities, for the socotorine aloes scarcely contains any, but to obtain a gummy extract with less resin, which is said to be equally purgative, less stimulating and less ungrateful. Its dose is ten or fifteen grains.

EXTRACTUM CINCHONÆ, *vulgo Corticis Peruviani.* Extract of Peruvian Bark. *Ph. Lond. Dub.*

"Take of Pale Peruvian Bark, in coarse powder, one pound; Water, one gallon. Boil to six pints, and strain the liquor while hot. In the same manner boil it four times, in the same quantity of water, and strain the liquors. Then reduce all these liquors, mixed together, to a proper consistence, by evaporation.

"This extract ought to be kept *soft*, fit to form pills; and *hard*, so that it may be reduced to powder."

The active matter of bark is in a great measure of an extractive and resinous nature, being more soluble in alcohol than in water; but the water, when assisted by a boiling heat, is capable of dissolving it; and as a great part of the bark in substance consists of inert ligneous matter, it might be supposed that some advantage is derived from this preparation. During the boiling and evaporation, however, it suffers a chemical change to a certain extent; for the decoction itself becomes turbid, during boiling, from the dissolved matter becoming less soluble, a change probably analogous to that which takes place in several varieties of vegetable matter, exposed in a humid state, and at an elevated temperature, and the nature of which, so far as it has been determined, has been already explained (page 38.) Hence the extract obtained is far from being equal in efficacy to the quantity of bark from which it is prepared. Its medium dose is ten grains, which is supposed to be equivalent to half a drachm of the bark in substance, but from the uncertainty of its strength it is little employed.

EXTRACTUM COLOCYNTHIDIS. Extract of Colocynth. Ph. Lond.

"Take of the Pulp of Colocynth, one pound; Water, a gallon. Boil to four pounds and strain the liquor while hot; then reduce it by evaporation to the proper consistence."

The active matter of colocynth is so far extracted by water by decoction, that the extract has a cathartic quality. It is less powerful, however, and has been supposed

to be less irritating than the pulp itself. Its dose is from six to ten grains.

EXTRACTUM COLOCYNTHIDIS COMPOSITUM. Compound Extract of Colocynth. *Ph. Lond. Dub.*)

"Take of the Pulp of Colocynth cut, six drachms; Socotorine Aloes in powder, an ounce and a half; Scammony in powder, half an ounce; Cardamom Seeds in powder, a drachm; Hard Soap, three drachms; Boiling Water, two pints. Macerate the pulp of colocynth in the water, with a gentle heat, for four days. Strain the liquor, and add to it the aloes, scammony and soap; then evaporate until it attain a proper consistence, and towards the end of the evaporation, mix in the cardamom seeds."

This is the officinal preparation which has long had a place in the Pharmacopœias, under the name of Extractum Catharticum. It is a combination of the more powerful cathartics; and as these operate more effectually, and with less irritation when combined, than when one alone in a large dose is employed, the composition is well adapted for administration in cases where it is difficult to excite purging. It used formerly to be prepared by employing diluted alcohol as the solvent, not only of the colocynth, but also of the resinous substances, and evaporating the solution; the present method is more economical, and will probably afford a product more uniform in strength. The extract is usually given in doses of from five to ten, or fifteen grains, repeated at short intervals until it produce purging. Its power may also be safely promoted, by adding a portion of calomel.

EXTRACTUM HUMULI. Extract of Hop. Ph. Lond.

"Take of Hops, half a pound; Water, a gallon. Boil to four pints, and strain the liquor while it is hot; then reduce it by evaporation to the proper consistence."

Hop has been introduced into practice as a narcotic, possessing also from its bitterness a degree of tonic

power. The bitterness will be obtained in this extract, but it is probable that the narcotic power is impaired, and that in this property it will not be uniform in strength. The dose of this extract is from five to fifteen grains.

EXTRACTUM OPII. **Extract of Opium. Ph. Lond. (Extractum Opii Aquosum, *Ph. Dub.*)**

"Take of Opium cut into pieces, half a pound; Water, three pints. Add to the opium a small quantity of the water, and macerate for twelve hours that it may become soft; then add gradually the remaining water, triturate until they are intimately mixed, and put aside the mixture that the impurities may subside: then strain the liquor, and evaporate it to the proper consistence."

Any process of this kind designed to purify opium, is altogether superfluous, for the impurities of the opium of commerce are inconsiderable, and neither alter its powers, nor add materially to its bulk. And if such processes are designed to correct any of the qualities of the opium, whence the unpleasant symptoms which sometimes follow from its administration are supposed to arise, they probably rest on inaccurate views of its operation. The active matter of opium is not entirely extracted by water. In the present process, therefore, the product must differ from the crude opium, and it would require clinical experience more extensive and accurate than we yet have, to ascertain correctly its real powers. It must, besides, be altered, and rendered at the same time uncertain in strength by the chemical change which it will suffer during its inspissation. Even when the active principles of the opium have been extracted by diluted alcohol, though the solvent is more powerful, requires less heat for its evaporation, and counteracts to a certain extent the action of the air, still the inspissated mass is found to be inferior in strength to opium in its unpurified state, and this must be still more the case in the present process, where water only is employed. It may therefore be questioned whether any

preparation of this kind retains its place with propriety in the Pharmacopœias.

EXTRACTUM RHEI. Extract of Rhubarb. Ph. Lond.

"Take of the Root of Rhubarb bruised, one pound; Diluted Alcohol, a pint; Water, seven pints. Macerate for four days with a gentle heat, and put aside the liquor that the impurities may subside; pour it off when clear, and reduce it by evaporation to the proper consistence."

The purgative power of rhubarb is usually considered as being more peculiarly extracted by water, and may therefore be obtained in this extract. It will equally be obtained, however, in the simple infusion, which, as being an extemporaneous preparation, is preferable to this one, that besides the change that may be produced in it by inspissation, must be farther liable to decomposition when kept in a soft state.

EXTRACTUM SARSAPARILLÆ. Extract of Sarsaparilla. Ph. Lond.

"Take of Sarsaparilla Root cut, a pound; Boiling Water, a gallon. Macerate for twenty-four hours; then boil to four pints, and strain the liquor while hot; lastly, reduce it by evaporation to the proper consistence,"

Sarsaparilla being usually given under the form of watery decoction, there appears to be no particular advantage in preparing from this an extract, as the decoction may be brought to any state of concentration, by using an increased proportion of the root, or continuing the boiling for a longer time. And a watery extract, mucilaginous as this is, besides the injury it will probably suffer in its inspissation, will farther be liable to spontaneous decomposition on keeping, and is therefore unfit for an officinal preparation.

EXTRACTUM TARAXACI. Extract of Dandelion. *Ph. Lond. Dub.*

"Take of the Fresh Root of Dandelion bruised, a pound; Boiling Water, a gallon. Macerate for twenty-four hours; then boil to eight pints, and strain the liquor while hot; lastly, evaporate it to the proper consistence."

The recent root of dandelion has been ranked as an aperient and diuretic. The expressed juice, or decoction of the root, has been employed as a remedy in dropsy, biliary obstructions and induration of the liver, and, according to Bergius, has proved frequently successful where other remedies had failed. Whatever may be the powers of the plant, it may be doubted if the form of the watery extract be the best for its administration.

EXTRACTUM VALERIANÆ. Extract of Valerian. Ph. Dub.

"Take of Valerian Root in coarse powder, six ounces; Boiling Water, three pints. Digest for twenty-four hours in a close vessel with a moderate heat; press out the liquor, and reduce it to a proper consistence by evaporation."

The medicinal powers of Valerian appear to be connected with the principle in which its odour resides; and as this must be in a great measure dissipated by evaporation, it may be doubted if this is a form of preparation properly adapted. It can at least have no advantage over the extemporaneous infusion or decoction.

EXTRACTUM CACUMINUM ABSINTHII. Extract of the Tops of Wormwood. Ph. Dub.

This extract prepared in the usual manner from the flowering tops of the wormwood, is intensely bitter; and the unpleasant odour of the plant is dissipated during the evaporation. It may be substituted medicinally for extract of gentian. It is sometimes used, instead of hops, to give bitterness to fermented liquors.

EXTRACTUM CACUMINUM GENISTÆ. Extract of Broom Tops. Ph. Dub.

The infusion of the tops of the broom has a degree of diuretic power, whence it has been employed as a remedy in dropsy. The extract can scarcely be supposed to have much power, and it is now expunged from the Edinburgh Pharmacopœia, where it formerly had a place.

EXTRACTUM RADICIS JALAPÆ. Extract of Jalap Root, Ph. Dub

The active matter of jalap is partly resinous, and must therefore be imperfectly extracted by water. The extract thus prepared may be milder than the root, but must be liable to be uncertain in strength. A resinous extract is prepared by the action of diluted alcohol, which has a place in all the Pharmacopœias, and which will be a more active preparation, though neither of them probably is of much utility.

EXTRACTUM CORTICIS QUERCUS. Extract of Oak Bark. Ph. Dub.

In this extract the astringency of the oak bark will be obtained probably with little injury, and consisting principally of tannin, it will not be very liable to spontaneous decomposition. It can have scarcely any advantage, however, but what may be equally obtained from the decoction.

EXTRACTUM FOLIORUM SABINÆ. Extract of Leaves of Savin. Ph. Dub.

The medicinal powers of this herb seem in a great measure to depend on its essential oil, and as this must be dissipated during the evaporation, the extract must be comparatively an inactive preparation. It is never used.

II.—*Extracta per Aquam et Alcohol.—Extracts by Water and Alcohol.*

THE directions for preparing these are given under the first of them, the Extract of Bark.

EXTRACTUM CINCHONÆ OFFICINALIS. Extract of Peruvian Bark. (Extr. Cinch. Resin. *Ph. Lond. Dub.*)

"Take of Peruvian Bark in powder, one pound; Alcohol, four pounds. Digest for four days, and pour off the tincture. Boil the residuum in five pounds of distilled water for a quarter of an hour, and strain the

decoction while hot through linen. Repeat this boiling and straining with an equal quantity of distilled water, and reduce the liquor by evaporation to the consistence of thin honey. Draw off the alcohol from the tincture by distillation, until it is reduced to a similar consistence. Then mix the liquors thus inspissated, and reduce to a proper consistence by a bath of boiling water, saturated with muriate of soda."

This preparation will probably be more active than the watery extract of bark. By the joint action of the alcohol and water, all the principles of the bark are extracted, and nothing remains but the inert ligneous fibre. And in the subsequent evaporation, the dissolved matter suffers less injury, partly from less heat being required to bring it to the due consistence, and partly perhaps from the alcohol resisting the oxygenation of the extract. It is, however, much more expensive; and the extract of bark to be found in the shops is almost always that which is prepared by the other formula. The dose of the spiritous extract is ten grains, and it affords a very convenient vehicle for combining bark with the more active preparations of iron in the form of pill.

Extractum radicis convolvuli jalapæ. Extract of Jalap. (Extr. Jalap Resin. *Ph. Dub. Lond.*)

This is ordered to be prepared in the same manner as the Extract of Bark. From the solvent employed both the resinous and mucilaginous parts of the jalap root are extracted, and it is therefore a more active preparation than the watery extract of jalap already noticed. It exerts its cathartic operation fully in a dose of ten or twelve grains, but it has no particular advantage.

Besides these two, which have a place both in the Dublin and the London Pharmacopœias, there are other two spiritous extracts admitted by the Dublin College.

Extractum cascarillæ resinosum. Resinous Extract of Cascarilla. Ph. Dub.

This is prepared from the cascarilla bark, in the same manner as the resinous extract of cinchona is prepared. It may contain the active matter of the cascarilla, and may be given as a bitter and tonic, in the dose of a scruple; but there does not appear to be any peculiar advantage in employing this remedy under this expensive form.

Opium purificatum. Purified Opium. Ph. Dub.

" Take of Opium cut into small pieces, one pound; Proof Spirit, twelve pounds. Digest them with a gentle heat, stirring them frequently until the opium is dissolved: strain the tincture through paper, and distil it in a retort until the spirit is abstracted; pour out the remaining liquor, and evaporate it until the extract become of a proper consistence. Purified opium must be kept in two states, one *soft*, so as to be fit for forming pills, the other *hard*, so as to be capable of being reduced to powder."

The objections to the purification of opium by the action of water have been already stated. In this process, as the power of the solvent is greater, and the degree of heat necessary to evaporate it less considerable, it is probable that the opium will suffer less change. Still we cannot be certain of its real power in this state, and the process is expensive, and altogether superfluous.

CHAPTER XV.

AQUÆ STILLATITIÆ.—DISTILLED WATERS.

Several of the principles of vegetable matter are so far volatile as to be elevated in vapour at the temperature of 212°; hence when water is distilled from them,

it is frequently impregnated with their taste and odour, and sometimes even with their more active powers. The odour, and frequently the pungency of plants reside in their essential oil; and this being always volatile at this temperature, the aromatic plants in which essential oil is most abundant, communicate these qualities to water distilled from them, a portion of the oil being retained in solution by the water. The acrid principle of some vegetables appears likewise to be so far volatile as to rise in distillation with water; and the prussic acid, in which the narcotic power of the bitter almond, cherry laurel, and similar plants resides, is also obtained by the same process: but these vegetables are comparatively few, and there are no officinal distilled waters having a place in the Pharmacopœias possessed of any important power; they are designed, from their flavour and agreeable pungency, to serve merely as vehicles for the exhibition of more active remedies, and all of them owe these qualities to the small quantity of essential oil which they hold dissolved.

Recent vegetables are in general more proper for distillation than after being dried, the water they afford being more grateful. They are therefore ordered in this state when they can be procured in it by the Edinburgh and Dublin Colleges. The London College on the contrary, order them to be used dried, as they cannot be procured fresh at all seasons of the year. When fresh, they in general impregnate sufficiently with their flavour and taste, three times their weight of water; when dry, double that quantity. As much must always be employed, as when drawn off by distillation a sufficient quantity shall remain in the still to prevent any part of the vegetable matter being scorched, and communicating empyreuma to the distilled water, the distillation being continued as long as the water that comes over has any taste or smell of the vegetable from which it is distilled. The flavour of the more delicate plants is injured by this operation; and these distilled waters are in general less grateful to the stomach than the infusions of the vegetable matter which yields them.

Distilled waters are liable to a species of decomposition, the nature of which has never been well determined. When long kept, they become viscid, and at the same time somewhat sour,—a proof that they hold dissolved some species of vegetable matter besides the minute portion of essential oil. To counteract this change, and preserve them more effectually in a proper state, a small quantity of alcohol, half an ounce to each pound of the distilled water, is ordered to be added to them.

Aqua distillata. Distilled Water. *Pharm. Ed. Lond. Dub.*

"Distil water in clean vessels until about two-thirds have distilled over."

Water does not occur in nature perfectly pure, but has generally a sensible impregnation of saline and earthy matter. Spring water which is purest, contains a little carbonate of lime, and muriates of lime and soda; river water contains sulphate and carbonate of lime, and muriate of soda; and well water, sulphate and carbonate of lime in larger quantity. For some purposes in Pharmacy, it is necessary to use water free from these substances, particularly in the solution of some earthy and metallic salts, several of which are decomposed by them, and if they are given in small doses, may, by such decompositions, be rendered nearly inert. In preparations too, where much water is evaporated, as in the formation of extracts, it has been judged preferable to employ distilled water, as the residual matter of common water will remain mixed with the product of the process, and uselessly add to its bulk, or even in some cases produce in it some chemical change. It is for these purposes that distilled water is ordered in the Pharmacopœias; but except where the use of it is rendered necessary from these circumstances, it ought not to be employed, as from losing in the distillation much of the air that it holds loosely dissolved, it is always vapid and unpleasant.

The process should be conducted with rather a gentle

heat, and ought not to be continued longer than until two-thirds of the water have distilled, as otherwise a minute portion of the saline matter might be brought over in the distillation.

Aqua citri aurantii. Water of Orange Peel.

"Take of the rind of the Orange, fresh, two pounds. Add as much water, that when ten pounds have been drawn off by distillation, a sufficient quantity shall remain to prevent empyreuma. After due maceration, distil ten pounds."

This distilled water has none of the bitterness of the orange peel, but merely its flavour, and is so little used, that it is not kept in the shops.

In the same manner are prepared the following distilled waters:

Aqua citri medicæ. Water of Lemon Peel,—ten pounds of water being drawn from two pounds of the fresh rind of the lemon. Like the preceding one, it has merely a slightly agreeable flavour, and is scarcely used.

Aqua corticis lauri cassiæ, Water of Cassia Bark.

Aqua corticis cinnamomi. Water of Cinnamon Bark,—ten pounds of water being distilled from a pound of each bark. The cinnamon water only has a place in the London and Dublin Pharmacopœias. The cassia water, when not prepared too pungent, can scarcely, however, be distinguished from that of the cinnamon, the essential oil of both these barks having a flavour nearly the same. The cassia water, therefore, being much less expensive than the cinnamon, is always substituted for it. It has the pungency and aromatic flavour of the cassia, and is hence in very common use to cover the ungrateful taste and flavour of other medicines. It is also sometimes given alone as an aromatic and stimulant.

Aqua menthæ piperitæ florentis. Peppermint Water. (Aq. Menth. Piperit. *Ph. Lond. Dub.*)—

Ten pounds of water are drawn by distillation from three pounds of green peppermint. It is strongly inpregnated with the flavour of the herb, and is very frequently used in mixtures to cover the flavour of other medicines. It is also frequently taken alone as a carminative.

Aquæ menthæ pulegii florentis. Pennyroyal Water. (Aq. Pulegii, *P. Lond. Dub.*)—Ten pounds of water are distilled from three pounds of the green herb. It has a flavour and taste similar to that of the peppermint, and is used for the same purposes.

Aqua fructus myrti pimentæ. Pimento Water. (Aq. Piment. *Ph. Lond. Dub.*)—Ten pounds of water are distilled from half a pound of the Jamaica pepper. It has the flavour of the Jamaica pepper, and its aromatic quality; but as this is not very pleasant it is not often used.

Aqua petalorum rosæ centifoliæ. Rose Water. (Aq. Rosæ, *Ph. Lond. Dub.*)—Ten pounds of water are drawn from six pounds of the fresh pale rose flowers. The water has all the flavour of the rose, and as it has no pungency or acrimony, it is often used for external applications, as in solutions of acetate of Lead, or sulphate of zinc for collyria.

There are a few Distilled Waters peculiar to the London or the Dublin Pharmacopœias, of so little importance, however, as to require scarcely more than enumeration.

Aqua anethi. Dillseed Water. Ph. Lond.—Its flavour is rather unpleasant, and it has little pungency.

Aqua carui. Caraway Water. Ph. Lond.—This has a considerable share of aromatic flavour and pungency, and may be employed as a carminative.

Aqua foeniculi. Fennel Water. *Ph. Lond. Dub.*—This has merely the weak flavour of the seeds, with little warmth.

Aqua menthæ viridis. Spearmint Water. Ph. Lond. (Aq. Menth. Sativ. *Ph. Dub.*)—Its flavour and taste are so similar to those of peppermint or pennyroyal, that it must be regarded as superfluous.

J.H. Hornby

CHAPTER XVI.

SPIRITUS STILLATITII.—DISTILLED SPIRITS.

Alcohol dissolves the essential oils of vegetables in much larger quantity than water does, and it might therefore be supposed that it may be more strongly impregnated with them by distillation, and hence possess in a much greater degree the aromatic flavour and pungency of the plant from which it is distilled. It is seldom, however, that this is the case; and from many vegetables alcohol acquires by distillation a weaker impregnation than water. This is owing to its greater volatility. All the essential oils are volatilized at a temperature of 212°, and must therefore rise with water in distillation, and impregnate it to the extent in which it can dissolve them. But there are many of them not volatilized at the temperature at which alcohol boils, and when distilled, therefore, from the plants containing them, it comes over weakly impregnated with their odour or pungency.

To obviate this, diluted alcohol, or proof-spirit as it is named, is employed in the distillation. It is macerated on the vegetable substance and is then distilled; the alcohol rises first nearly pure, but as the distillation proceeds the liquor requires always a higher temperature to cause it to boil: the vapour therefore is more largely impregnated with the essential oil, and towards the end of the distillation the whole of it is brought over with the last portion of water; and the spirit, which has previously been distilled, being mingled with this, forms a transparent solution. This forms a distilled spirit. There are at least only two in which pure alcohol is the solvent,—the spirit of lavender and spirit of rosemary, the essential oils of these plants being sufficiently volatile to be elevated at the temperature at which alcohol distils.

Distilled spirits are preparations of no great importance. Like the distilled waters they serve merely as

vehicles for the administration of more active medicines, the taste and flavour of which they cover or render more grateful; or they are occasionally employed as grateful stimulants, to relieve nausea or flatulence. The directions for preparing them are given, in the Edinburgh Pharmacopœia, under the first of them.

Spiritus cari carui. Spirit of Carraway. (Spirit. Carui. *Ph. Lond. Dub.*)

"Take of Carraway Seeds bruised, half a pound. Diluted Alcohol, nine pounds. Macerate during two days in a close vessel; then add a sufficient quantity of water to prevent empyreuma, and draw off nine pounds by distillation."

In the same manner are prepared the following spirits, nine pounds being drawn from the quantities affixed to each

Spiritus corticis lauri cinnamomi. Spirit of Cinnamon *Ph. Ed. Lond. Dub.* (Bark of Cinnamon, one pound).

Spiritus menthæ piperitæ florentis. Spirit of Peppermint. *Ph. Ed. Lond. Dub.* (Herb of peppermint, one pound and a half).

Spiritus nucis myristicæ moschatæ. Spirit of Nutmeg. *Ph. Ed. Lond. Dub.* (Nutmeg bruised, two ounces).

Spiritus fructus myrti pimentæ. Spirit of Pimento. *Ph. Ed. Lond. Dub.* (Fruit of pimento, bruised, half a pound).

To these may be added the following from the London Pharmacopœia, which are prepared in the same manner:

Spiritus anisi. Spirit of Anise.

Spiritus menthæ viridis. Spirit of Spearmint.

Spiritus pulegii. Spirit of Pennyroyal

All these spirits have the aromatic flavour, and to a

certain extent the pungency of the vegetables from which they are prepared. They require, therefore, no particular observations.

Of Compound Spirits, the following have a place in the Pharmacopœias:

Spiritus juniperi communis compositus. Compound Spirit of Juniper. *Ph. Ed. Lond. Dub.*

"Take of Juniper Berries bruised, one pound; Carraway Seeds, Fennel Seeds, of each bruised one ounce and a half; Diluted Alcohol, nine pounds. Macerate for two days; and, having added as much water as is sufficient to prevent empyreuma, draw off nine pounds by distillation."

This is a grateful cordial spirit, which has been used as a carminative, and as a stimulant and diuretic in dropsy.

Spiritus anisi compositus. Compound Spirit of Anise. Ph. Dub.

"Take of Anise Seeds, Angelica Seeds, of each bruised half a pound; Proof Spirit, one gallon; Water as much as is sufficient to prevent empyreuma. Distil one gallon."

This is similar to the preceding spirit, milder and perhaps less grateful. It has also been used as a carminative.

Spiritus armoraciæ compositus. Spirit of Horse-Radish. Ph. Lond. (Spiritus Raphani Compositus. *Ph. Dub.*

"Take of fresh Horse-Radish root cut, dried Orange Peel, of each one pound; Nutmegs bruised, half an ounce; Proof-Spirit a gallon; Water, as much as is sufficient to prevent empyreuma. Macerate for twenty-four hours, then distil a gallon with a slow fire." There was formerly in this composition two pounds of fresh scurvy grass, and this is still retained by the Dublin College.

This compound spirit was formerly recommended as an antiscorbutic. It has justly fallen into disuse.

There remain, lastly, those Distilled Spirits prepared with Pure Alcohol.

Spiritus lavendulæ spicæ. Spirit of Lavender. *Ph. Ed. Lond. Dub.*

"Take of Fresh Lavender Flowers, two pounds; Alcohol, eight pounds. Draw off seven pounds by distillation with the heat of a water-bath."

This oil of Lavender is sufficiently volatile to be elevated with alcohol in vapour, and it is completely dissolved by it. The spirit is used principally as a grateful stimulating perfume, which gives relief in headach, drawn up the nostrils, or applied to the forehead.

Spiritus lavendulæ compositus. Compound Spirit of Lavender. *Ph. Ed. Lond. Dub.*

"Take of Spirit of Lavender, three pounds; Spirit of Rosemary, one pound; Cinnamon Bark bruised, one ounce; Cloves bruised, two drachms; Nutmeg bruised, half an ounce; Red Saunders Wood rasped, three drachms. Macerate seven days and strain." In the formula given by the London College the cloves are omitted.

This tincture is a grateful cordial and stimulant in common use, for relieving languor and faintness. Its dose is thirty or forty drops, taken on a piece of sugar or in a cupful of water.

Spiritus rorismarini officinalis. Spirit of Rosemary. *Ph. Ed. Lond. Dub.*

"Take of Fresh Rosemary Tops, two pounds; Alcohol, eight pounds. Draw off seven pounds by distillation by the heat of boiling water."

The London College employ diluted alcohol in the preparation of this spirit.

Spirit of Rosemary is a very fragrant perfume, and is in common use for the same purposes as the simple Spirit of Lavender.

Alcohol. Alcohol. Spiritus Vinosus Rectificatus. Rectified Spirit of Wine.

There is no process given in the Edinburgh Pharmacopœia for the preparation of alcohol. It is supposed to be procured from those who prepare it on a large scale, and is inserted in the catalogue of the articles of the Materia Medica, as of the specific gravity .835, this being a strength at which it can be procured without difficulty, and being sufficient for any purpose to which it requires to be applied in Pharmacy. It is procured of this strength from any of the spiritous liquors of commerce by slow distillation with a gentle heat, a portion of sub-carbonate of potash heated being previously added to abstract the water more effectually from the spirit. It is usually submitted to a second distillation, and a little alum is frequently added previous to this, to remove any of the alkali which might be held in solution in the spirit obtained by the first distillation.

The London and Dublin Colleges, while they have also inserted alcohol of this strength, under the name of Rectified Spirit, in the catalogue of the articles of the Materia Medica, have given a process to obtain it more concentrated for particular purposes. The following are the directions in the London Pharmacopœia:

Take of Rectified Spirit a gallon; Sub-carbonate of Potash, three pounds. To the spirit add a pound of the sub-carbonate of potash previously heated to 300 degrees, and macerate for twenty-four hours, shaking frequently; then to the spirit poured off, add the remaining portion of the sub-carbonate of potash heated to the same degree; lastly, distil the alcohol from a water-bath, and preserve it in a vessel well stopped. The specific gravity of alcohol is to that of distilled water as 815 to 1000.

The process in the Dublin Pharmacopœia is nearly the same. A gallon of rectified spirit is mixed with an ounce of pure potash; a pound of the potash of commerce heated is added, and they are digested in a close vessel for three days, being frequently agitated: to the spirit

poured off, half a pound of dried muriate of lime is added, and it is distilled with a gentle heat. The specific gravity of the product is .815.

The concentration of the alcohol in both processes is obviously obtained by the action of substances having a strong affinity to water,—the sub-carbonate of potash, and the muriate of lime; these attract it from the spirit, and counteract its volatility so as to prevent its rising in the distillation. The muriate of lime exerts this agency most powerfully; and by repeated distillation from it, alcohol has been brought to its highest state of concentration, its specific gravity being so low as .800 or 798, at the temperature of 60°. Alcohol, rectified even so highly as is ordered by the London and Dublin Colleges, is required for very few pharmaceutic processes; and hence, in the greater number of their officinal preparations, rectified spirit, that is, alcohol of the specific gravity of .835, is directed to be employed. The proof spirit of the Edinburgh College, formed from equal parts of rectified spirit and water, is of the specific gravity of .935. That of the London and Dublin Colleges is stated at .930, and will be obtained of this strength by mixing four parts by measure of rectified spirit with three parts of water. The properties of alcohol as an agent in pharmacy, and its medicinal applications, have been already enumerated.

CHAPTER XVII.

OLEA VOLATILIA, OLIM OLEA STILLATITIA VEL ESSENTIALIA.—VOLATILE OILS, FORMERLY DISTILLED OR ESSENTIAL OILS.

Essential oil, as a proximate principle of vegetables, has already been considered, and its distinctive properties pointed out. As yielded by different vegetables, its chemical characters are nearly uniform: but the

oils of different plants vary in their sensible qualities, particularly in those of colour, consistence, odour, and taste. Their odour is that of the plant from which they are procured; their taste also is frequently the same, particularly in those plants named aromatic, and it is always pungent and acrid; their colours are shades of yellow, green and brown; they are usually liquid, but sometimes of a thick consistence.

In a few cases, these oils, existing in distinct vesicles, can be obtained by expression. Usually they are diffused through the vegetable matter, so as to render this impracticable; they are then obtained by distillation; the plant being distilled with a portion of water, not larger than what is necessary to avoid emporeuma. The oil is volatilized with the watery vapour; and though a portion remains dissolved, yet from the sparing quantity of water employed, the greater part is collected apart, either, according to its specific gravity, floating on the surface, or having subsided to the bottom. In performing the operation in the large way, the same water is repeatedly put into the still, by which the loss from the oil being dissolved is in a great measure avoided. The product of oil is very different from different plants; and it is to be remarked, that the most odorous and pungent plants do not afford the largest quantity, even where the oil is the principle in which the odour or pungency resides;—the petals of the rose for example, or the bark of cinnamon, affording a quantity extremely small, though in the one of these the oil has the entire flavour of the flower, and the other the aromatic warmth of the bark. The quantity and quality of the oil are also influenced by the circumstances of climate, soil and season; the rich aromatic oils being generally more fragrant from the plant when growing in a warm climate and dry soil, than under the reverse of these; and the oil afforded by the aromatic vegetables of this climate is in general stronger, and in larger quantity, in a dry than in a wet season. The oil at its first distillation has frequently an odour less grateful than after it has been kept for some time; by age, however, its flavour is improved. If the

air has not been carefully excluded it at length becomes thick; some deposite a little camphor, and others, when distilled anew, yield an oil similar to the original, a resinous substance being left.

The essential oils of commerce are sometimes adulterated, either by the addition of a cheaper oil, as that of turpentine, of an expressed oil, or of alcohol. These frauds are easily detected,—the first by the smell, when the adulterated oil is dropped on paper, and heated so far as be volatilized; the second, by the oil forming a greasy spot when dropped on paper, which remains so even after heat has been applied; the third, by the oil, when dropped on water, forming a milky, instead of a transparent film on the surface of the water.

Essential oils are seldom applied to answer any important indication, having scarcely any other powers than those of aromatic warmth and pungency. If used alone to relieve flatulence or nausea, they may be diffused in water by the medium of mucilage and sugar, or dissolved in alcohol, and the solution diluted with water. More generally they are employed as corrigents, to improve the taste and flavour of ungrateful medicines, to cause these to sit easier on the stomach, or to obviate nausea, or any unpleasant symptom they may be liable to produce.

The following general rules with regard to the preparation of these oils are given in the Edinburgh Pharmacopœia. " These oils are to be prepared in the same manner as the distilled Waters, except that a smaller quantity of water is to be added. Seeds and roots are to be previously bruised or rasped. The oil is brought over with the water, and, according as it is lighter or heavier, floats on the surface, or falls to the bottom, and is afterwards separated.

" It is also to be observed with regard to the preparation of distilled waters and oils, that, according to the quality of the substances, their texture, the season of the year, and similar circumstances, so many differences must arise, that it is scarcely possible to give any certain

and general rules which shall apply strictly to every example. Many things therefore are omitted, to be regulated according to the judgment of the operator, the most general precepts only being delivered."

To the general rules given by the London and Dublin Colleges, which are similar, it is added that the water which is produced in the distillation of the oils of carraway, peppermint, spearmint, pennyroyal, pimento, and sweet fennel, may be preserved for use, as it is sufficiently impregnated with the essential oil.

The following oils are those inserted in the Edinburgh Pharmacopœia, and with the exception of the oils of savin and sassafras, they have a place likewise in the London and Dublin Pharmacopœias.

Oleum baccarum juniperi communis. Oil of Juniper.—When genuine, this oil has the flavour of the juniper berries, and is soluble in alcohol. There is generally substituted for it in the shops an oil distilled from some species of turpentine much less grateful, which alcohol does not dissolve.

Oleum juniperi sabinæ. Oil of Savine.—This plant yields more essential oil than any other does, two pounds affording not less than five ounces. The virtues of the savine seem also to depend on it, as the essential oil is said to be a powerful emmenagogue, in a dose from three to ten drops. It is however very little used.

Oleum spicarum florentium lavandulæ spicæ. Oil of Lavender.—This oil is used principally on account of its flavour.

Oleum radicis lauri sassafras.—Oil of Sassafras. This is the heaviest of the essential oils; its odour is somewhat fragrant, and its taste warm, but it has no quality that renders it of much value.

Oleum herbæ menthæ piperitæ florentis. Oil of Peppermint.—This is one of the most pungent of the essential oils, and at the same time excites a peculiar sensation of coolness. It is a common and convenient remedy to relieve flatulence and anorexia, under the form of what is named Essence of Peppermint,—

a solution of one part of the oil in seven parts of alcohol; the dose of this being fifteen or twenty drops in a cupful of water.

Oleum fructus myrti pimentæ. Oil of Pimento.—This oil having the flavour of the Jamaica pepper, is sometimes used on account of this flavour.

Oleum seminum pimpinellæ anisi. Oil of Anise.—This oil is of a light colour, and has rather an unpleasant smell. It congeals even at a very moderately cold temperature. It has less pungency than any of the other essential oils, and is therefore well adapted to the purpose to which it is usually applied, that of relieving flatulence and the symptoms arising from it in children, a little of it being rubbed with sugar, and mixed with the child's food. The common proportion is ten or fifteen drops of the oil to two ounces of sugar.

Oleum summitatum florentium rorismarini officinalis, Oil of Rosemary.—The odour of this oil is less grateful than when it is diluted with alcohol in the form of spirit of rosemary. It is sometimes used in ointments as a perfume, and it enters as a stimulant into the composition of the soap liniment.

Besides these, a few other Volatile Oils have a place in the London and Dublin Pharmacopœias.

Oleum anthemidis. Oil of Chamomile. Ph. Lond. —This oil has an unpleasant flavour, and is applied to no use.

Oleum carui. Oil of Carraway. *Ph. Lond. Dub.*—This is one of the most grateful of the essential oils, and well adapted to act as a carminative, or to communicate an agreeable pungency, and cover the flavour of unpleasant remedies.

Oleum menthæ viridis. Oil of Spearmint. *Ph. Lond. Dub.*—The flavour of this oil is similar to that of peppermint, rather less grateful, and its taste is less pungent.

Oleum origani. Oil of Origanum. *Ph. Lond. Dub.* —This is occasionally used as a perfume, though less grateful than the oil of lavender.

Oleum pulegii. Oil of Pennyroyal. Ph. Lond.—This oil resembles the oil of peppermint and spearmint, and may be regarded as superfluous.

Oleum foeniculi dulcis. Oil of sweet Fennel. Ph. Dub.—The flavour of this oil is similar to that of Anise.

Oleum rutæ. Oil of Rue. Ph. Dub.—The flavour of oil of rue is ungrateful, and though it has been regarded as an emmenagogue, it is altogether discarded from use.

Under the chapter of Volatile Oils are inserted some other preparations besides the Essential Oils of Plants.

Oleum succini et acidum succini. Oil of Amber and Acid of Amber. (Ol. Succini. *Ph. Lond. Dub.*— Acid Succini. *Ph. Dub.*)

" Take of Amber in powder, Pure Sand. equal parts. Put them mixed together into a glass retort, of which they shall fill one half. Having adapted a large receiver, distil from a sand-bath, with a fire gradually raised. First, a watery liquor with a little yellow oil will distil over; then a yellow oil with an acid salt; afterwards a reddish and black oil. Pour the liquor out of the receiver, and let the oil be separated from the water. Let the acid salt, collected from the neck of the retort and the sides of the receiver, be pressed between folds of bibulous paper, and freed from the adhering oil. Then purify it by solution in hot water and chrystallization."

Oleum succini purissimum. Purified Oil of Amber.

" Distil Oil of Amber mixed with six times its weight of Water, from a glass retort, until two-thirds of the water have passed into the receiver. Then separate this purified volatile oil from the water, and keep it in vessels well stopped."

The Dublin college retain both the Acid and Oil of

Amber, and give nearly the same directions for their preparation. The London College admit the oil only.

Amber is a bituminous substance found in the layers of bituminated wood, or in fragments or masses on the sea-shore in different countries, the origin or natural formation of which is not well ascertained. It is also possessed of peculiar characters; for although it approaches to the vegetable resins in a number of its properties, it differs in others, and differs remarkably in the products it affords when decomposed by heat. These products are an acid *sui generis*, which being procured from no other substance, receives from this bitumen the name of Succinic Acid; and a peculiar empyreumatic oil. The process is conducted according to the directions given in the Pharmacopœia. The heat requires to be raised gradually, and the interposition of the sand is useful by dividing the particles of amber, and preventing it, when it melts, from swelling up, and passing over into the receiver.

The succinic acid is in part dissolved by the water which condenses in the receiver, but the greater part is condensed in the form of a crust. When purified from the adhering oil, it is obtained in minute crystal, rhomboidal plates, of a brownish colour from a little oil still adhering to it; these are rather sparingly soluble in water, requiring 24 parts at 60° for their solution; the taste of this acid is penetrating and slightly sour; it reddens the vegetable colours, is soluble in alcohol, volatile and inflammable. In medicine it has been regarded as an antispasmodic and diuretic; but it appears to be wholly inactive, and is altogether discarded from practice.

The oil of amber procured by the first distillation is thick, of a dark brown colour, and a very fœtid smell; by successive distillations it is obtained of a thinner consistence and lighter colour, and can at length be rendered nearly limpid. Its smell still remains, however, peculiar, and ungrateful; its taste is hot and acrid; it is volatile and inflammable, insoluble in water, and sparingly soluble in alcohol. In medical practice it has been

celebrated as a stimulant and antispasmodic, and has been given in amenorrhœa and hysteria in a dose from ten to fifteen drops. Its internal administration is, however, entirely relinquished. Externally it is sometimes applied by friction as a stimulant in paralysis, and to relieve the pain of cramp and rheumatism; but its strong unpleasant smell renders the application extremely disagreeable.

OLEUM VOLATILE PINI PURISSIMUM, *olim Oleum Terebinthinæ purissimum.* Rectified Oil of Turpentine. (Oleum Terebinthinæ Rectificatum. *Ph. Lond. Dub.*)

"Take of Oil of Turpentine, one pound; Water, four pounds. Distil as long as any oil passes over."

The oil of turpentine of commerce is obtained by distillation from what is named Common Turpentine, the juice of the *Pinus Larix*, or sometimes from the wood of the tree. It appears to contain a small portion of resinous matter, as when distilled it leaves a little of a thick residuum, and the distilled oil has been said to be more volatile. The process, however, is difficult to perform, from the great volatility of the oil, and the diffusibility of its vapour; it is one too wholly superfluous, the common oil being sufficiently pure for any purpose to which it requires to be applied in medicine, and it is accordingly never attended to in the shops. The medicinal properties of this oil have been already considered.

OLEUM CORNU CERVINI RECTIFICATUM. Rectified Oil of Hartshorn. Ph. Dub. (Oleum Animale. Animal Oil.)

"Take of the Oil which rises in the distillation of the volatile liquor of Hartshorn, three pounds; Water, six pounds. Distil the oil, mix it again with water, and distil it a second time; repeat this operation frequently until it become limpid. It must be kept in small phials quite filled with it, closely stopped, and in a dark place."

Animal substances submitted to heat suffer decomposition, their elements entering into new combinations, and one of the principal products of these combinations

is empyreumatic oil, formed from the combination of portions of the hydrogen and carbon of the animal matter. This product is obtained abundantly in the decomposition of bone or horn by heat, along with the carbonate of ammonia formed in the same process. It is at first thick, of a dark brown colour, and offensive odour: but by repeated distillations from water it is rendered thinner, more limpid, and less offensive. In this rectified state it has been celebrated as a stimulant and antispasmodic, but is discarded from modern practice.

CHAPTER XVIII.

OLEOSA.—OILY PREPARATIONS.

The preparations included in this chapter, under this name, are combinations of expressed oils with more active substances, principally designed for external application, the oil moderating their action, or communicating a convenient form.

OLEUM AMMONIATUM, *vulgo Linimentum Volatile.* Ammoniated Oil, commonly called Volatile Liniment.

"Take of Olive Oil, two ounces; Water of Ammonia, two drachms. Mix them." The same preparation has a place in the Dublin Pharmacopœia, under the name Linimentum Ammoniæ. In the London Pharmacopœia, a stronger preparation is ordered, LINIMENTUM AMMONIÆ FORTIUS, consisting of Water of Ammonia, half an ounce; Olive Oil, two ounces. Another is inserted under the title LINIMENTUM AMMONIÆ CARBONATIS, composed of Water of Carbonate of Ammonia, half an ounce; Olive Oil, three ounces, which, both from the nature and proportion of its ingredients, is milder.

In these compositions the alcali combines with the expressed oil, forming a thick white saponaceous com-

pound. They are all used as rubefacients, and are convenient for application; a piece of linen moistened with any of them being applied to the part, or sometimes friction being made with the liniment for a short time. The composition of the Edinburgh College seems on the whole best adapted to general use, as of medium strength, and, if necessary, it is easy to render it a little more active.

Oleum camphoratum. Camphorated Oil. (Linimentum Camphoræ, *Ph. Lond.*—Ol. Camph. *Ph. Dub.*)

"Take of Olive Oil, two ounces; Camphor, half an ounce. Mix them, so as that the camphor may be dissolved."

This is a form under which camphor is frequently applied externally as a stimulant and anodyne, and is the most convenient one, when it is to be applied by friction. It is sometimes rendered more active by the addition of a little ammonia.

Oleum sulphuratum. Sulphurated Oil. (Oleum Sulphuratum. *Ph. Lond.*)

"Take of Olive Oil, eight ounces; Sublimed Sulphur, one ounce. Boil with a gentle fire, in a large iron pot, stirring constantly until they unite." In the London Pharmacopœia, the proportion of sulphur is two ounces to eight of oil.

This process, though apparently simple, is attended with some difficulty, the oil being very liable to boil over, or its vapour to catch fire. It is one too unnecessary, for although the composition has been recommended in catarrh, asthma, and phthysis, it has fallen altogether into disuse. It is extremely acrid and offensive. When employed, it was given in a dose from ten to thirty drops.

CHAPTER XIX.

SALES ET SALINA.—OF SALTS AND SALINE SUBSTANCES.

The term Salt has long been employed, in chemical language, to denote an extensive order of substances; yet it is difficult to assign to it a precise definition, or to distinguish these by characters at once sufficiently comprehensive and appropriate. It is from a combination of the following properties, however, that the definition has been attempted to be formed.

Salts are said to be bodies eminently sapid, or which excite a strong penetrating taste when applied to the tongue. Many of them have indeed this power, but there are others, particularly among the earthy salts, in which any degree of sapidity is scarcely perceptible, while there are many bodies eminently sapid which are not of a saline nature.

2d. All salts are supposed soluble in water, and this, strictly speaking, is perhaps true; but in many of them, the degree of solubility is so inconsiderable, that it can scarcely be assigned with propriety as a distinctive character of the order. Sulphate of barytes, for example, is not soluble in five thousand times its weight of water, and there are several others nearly equally insoluble.

3d. Salts are said to be capable of assuming a crystalline form. When dissolved in water, many of them, on evaporation of part of the water, concrete into regular crystals. But there are others which, either from being sparingly soluble in that fluid, or from having a strong attraction to it, cannot be made to crystallize; while there are substances crystallizable even from their watery solution, sugar, for example, not saline.

4th. Salts are said to be fusible by the application of heat. But the same character may be assigned to every other fossil substance, the pure earths excepted; and

there are besides many salts, which, instead of being fused, are decomposed in a high temperature.

Lastly, Salts have been considered as uninflammable; and many of them must be so, as they are formed of substances already saturated with oxygen; but there are many others, as ammonia and the vegetable acids, as well as the compounds of these, which are more or less inflammable; some of them even burn with a bright flame.

It is evident, therefore, that those properties which have been assigned as the characters of the order, are not possessed by every substance which, in chemical arrangements, is regarded as saline, but that, on the contrary, the exceptions are very numerous. Neither are they possessed exclusively by these substances; there being bodies not saline which are sapid, soluble in water, fusible by heat, uninflammable, and which have even a tendency to assume the crystalline form.

The characters of this order, therefore, are now drawn rather from the chemical composition of the substances arranged under it. It is thus understood as comprehending the acids, the alcalis, and the compounds resulting from the combination of acids with alcalis, earths, and metallic oxides. The acids and alcalis are named Simple or Primitive Salts; the others Secondary, or more commonly Neutral Salts, as in general the properties of the acid, and of the alcali, earth, or metal of which they are formed, are neutralized or lost. These are the substances comprised under the present chapter, with a few associated with them for convenience, though not strictly connected with them. They are, generally speaking, preparations of importance, but differing so widely in chemical constitution and medicinal powers, as to admit of no general observation.

Acidum acetosum destillatum. Distilled Acetous Acid. (Acid Aceticum, *Ph. Lond.*—Acetum Distillatum, *Ph. Dub.*)

"Distil eight pounds of Acetous Acid in glass vessels, with a slow fire. The two pounds that first come

over are to be rejected as too watery ; the four pounds which follow are the distilled acetous acid. The residuum affords a still stronger acid, but too much burnt." The London College order the first pound only to be rejected, and the distillation to be continued until seven pounds have distilled over. The proper name of the acid thus obtained is Diluted Acetic Acid.

Vinegar, Acetous acid as it is named by the College, as it is produced by fermentation, consists of acetic acid, largely diluted with water, and mixed with a number of other substances,—tartaric acid, extractive, mucilaginous, and saccharine matter. From these it is purified by distillation, but it is still largely diluted with water ; the distilled liquor is indeed even weaker than the vinegar itself, a larger portion of the acid remaining in the residual liquor ; and, in general, it receives from the distillation somewhat of an empyreumatic odour. It is usual, on the large scale, to perform the distillation in a tin still, connected with a tin spiral tube in a refrigeratory, and to add portions of boiling water during the distillation, so as to dilute the residual liquor, and bring over the whole of the acid. The process, however, ought to be conducted in glass vessels, as directed in the Pharmacopœia ; as, from metallic ones, (tin, which has been employed, being often alloyed with lead), the acid may receive an impregnation that might prove noxius.

Distilled acetous acid is colourless, not very sour to the taste, usually slightly empyreumatic, and of a specific gravity of 1006. It is chiefly employed as a solvent of some vegetable substances, and in making some of the salts. Sometimes it is applied externally, in preference to common vinegar, as a discutient, and as an application to burns. It has the advantage, as a pharmaceutic agent, not only of greater purity, but of not being liable, like undistilled vinegar, to spontaneous decomposition.

Acidum acetosum forte. Strong Acetous Acid.

"Take of Dried Sulphate of Iron, one pound; Acetate of Lead, ten ounces. Rub them together Put them into a retort, and distil from sand with a moderate fire, as long as any acid comes over."

Acidum aceticum. Acetic Acid. Pharm. Dub.

"Take of Acetate of Potash, six ounces; Sulphuric Acid, three ounces. Put the acid into a tubulated retort and add to it gradually, and in different portions, the acetate of potash, allowing the mixture to cool after every addition; then distil the acid with a moderate heat until the residuum is dry. The specific gravity of this acid is to that of distilled water as 1070 to 1000."

These are two processes for obtaining acetic acid in a concentrated state, and others have likewise been employed. One giving perhaps a stronger acid than either of them, has been long in use, and had a place in the former edition of the London Pharmacopœia. It consists in exposing verdigris, which is a sub-acetate of copper, well dried, to a heat gradually raised, and purifying the acid which distils over by a second distillation; the high temperature in this process merely expelling the acetic acid from the metallic salt. In the process of the Edinburgh Pharmacopœia, the expulsion of the acetic acid from the acetate of lead is favoured by the affinity exerted to the oxide of lead by the sulphuric acid of the sulphate of iron; and as the salts are dried, or contain little water of crystallization, the acid is supposed to be obtained in a concentrated state. In the process given by the Dublin College, the sulphuric acid combines with the potash of the acetate of potash, and disengages the acetic acid. This distils over, and as the acetate of potash contains little water, and the water of the sulphuric acid must be in part retained by the affinity exerted to it by the sulphate of potash, the acetic acid is obtained in a concentrated form.

Chemists had observed some difference of properties

between the acetic acid obtained from the decomposition of verdigris by heat, radical vinegar as it was named, and the acid of vinegar purified by distillation, and concentrated by freezing, or obtained in a concentrated state by the decomposition of an acetate having an alkaline or earthy base. They were therefore regarded as chemically different; the one, that obtained from the metalic salt, was believed to be more highly oxygenated, in consequence of receiving, it was supposed, oxygen from the metallic oxide, and was named Acetic Acid; while the other, to denote its relation to this, was named Acetous Acid. At a later period, it was supposed that they differed rather in the proportion of carbon existing in their base. But the experiments, first of Adet, and since of Darracq, have proved, that they differ merely in degree of concentration, (that expelled from the metallic salt by heat being strongest,) and sometimes in a small quantity of extractive matter adhering to the acid concentrated by freezing. When freed from this, and when brought to the same specific gravity by diluting the stronger, they have the same properties, display the same affinities, and afford the same products by analysis. There is therefore only one acid, the Acetic, and the name Acetous is not properly applied.

The process of the Edinburgh College affords an acid not so highly concentrated, and therefore not so pungent as that in which it is procured by exposing verdigris to heat. That procured by the process of the Dublin College is rather stronger; and it has the advantage of not being liable to be contaminated by any metallic impregnation. It is also free from sulphurous acid, with a portion of which the others are sometimes impregnated. A process, which would afford it equally pure, and probably stronger, would be to decompose the solid acetate of lime by sulphuric acid, as the sulphate of lime, by its strong affinity to water, would detain it; or the acid may be brought to the highest state of concentration, by distilling it from dry muriate of lime.

Acetic acid, in its highly concentrated state, has a

fragrant, and, at the same time, very sharp penetrating odour; its taste is extremely sour and pungent, and it is so acrid as to inflame the skin. It is highly volatile, evaporating at the common temperature of the atmosphere; it is also inflammable when a burning body is approached to its vapour. It exerts the agencies of a powerful acid, and it has a very peculiar action on several of the proximate principles of vegetables, whence it can be applied to pharmaceutical purposes,—dissolving them, without decomposing them, or materially altering their properties. It thus dissolves resins, gum-resins, camphor, and essential oils. It is employed medicinally, principally as a stimulating perfume in langour or faintness, or to obviate the unpleasant smell of confined or corrupted air. The combination of it with camphor is principally used for this purpose, as has been noticed under the chapter of medicated vinegar, in which a preparation of this kind has a place.

Acidum benzoicum. Benzoic Acid.

" Take of Benzoin, twenty-four ounces; of Carbonate of Soda, eight ounces; Water, sixteen pounds. Boil the benzoin, rubbed with the carbonate, in water for an hour, stirring them constantly, and strain. Boil the residual balsam in other six pounds of water, and strain. Mix this when strained with the former liquor, and evaporate until two pounds remain. Strain again, and drop into the liquor, as long as there is any precipitation, diluted sulphuric acid. Dissolve the precipitated benzoic acid in boiling water. Strain the liquor while hot, through linen, and put it aside, that crystals may form. These crystals being collected, and washed with cold water, dry and preserve them."

The same process nearly is followed by the London College, lime being substituted for carbonate of potash, and muriatic acid for sulphuric acid. A pound and a half of benzoin are boiled with four ounces of recently prepared lime, in a gallon of water, for half an hour, stirring them constantly. This being poured off, the re-

maining matter is boiled in four pints of water; the two portions are mingled together, and reduced by evaporation, to one half, and into this, when strained, muriatic acid is dropt in as long as there is any precipitation. The precipitate is dried by a gentle heat, and being put into a proper vessel, the acid is sublimed by a slow fire.

The Dublin College have retained the old process of sublimation for procuring this acid. The benzoin is melted in a wide-necked retort, to which a receiver is adapted without being luted, and it is sublimed with a moderate heat. The sublimed matter condensing in the neck of the retort is removed occasionally, that it may not accumulate in two great quantity. If stained with oil, it is to be pressed, wrapped up in bibulous paper, which will absorb the oil, and is to be again sublimed.

Benzoic acid exists in the various balsams, in benzoin, in largest quantity: and it is procured without difficulty, by sublimation, from the application of a moderate heat. It is this process that has been generally employed; the other methods are introduced as more economical. In the process of the Edinburgh College, the acid of the benzoin combines with the soda of the carbonate of soda, forming a soluble salt; the sulphuric acid when added, combines with the soda, and the benzoic acid, being sparingly soluble in cold water, is precipitated. The process given by the London College is essentially the same; the benzoic acid combining with the lime, and forming a soluble salt: this cannot, however, be decomposed by sulphuric acid, as the sulphate of lime would be precipitated with the acid; muriatic acid, therefore, is added, which combines with the lime; the muriate of lime remains dissolved, and the benzoic acid is thrown down.

The quantity of benzoic acid obtained by sublimation is greater than can be obtained by the other methods, the product, according to Mr. Brande's experiments, amounting to two ounces from a pound of benzoin, while, according to the others, it is equal only to from one ounce five drachms, to one ounce six drachms and

a half. But there is a difficulty in conducting the process by sublimation, from a portion of the oily matter of the benzoin being liable to rise with the acid in vapour, and communicating to it a brown tinge. By managing the heat, however, with due precaution, and changing the receiver towards the end of the sublimation, this may be avoided, at least so far as to obtain a pure product, nearly equal in quantity to that from the other methods; and as the sublimed acid is more white and brilliant than the precipitated acid, even when the latter is dissolved and crystallized, this method is still usually followed by the practical chemist. The London College give the precipitated acid the same brilliant appearance by sublimation.

Benzoic acid is in slender needle-like crystals, or in soft flakes, of a white colour and silky lustre; its taste is pungent and acidulous, its odour aromatic, and when it is heated, penetrating; this odour, however, appears to arise from a minute portion of oily matter adhering to it, as by dissolving the acid in alcohol, and precipitating it by water, it is obtained nearly inodorous. It is volatile and inflammable, is scarcely sensibly soluble in cold water, but is dissolved abundantly by hot water, and is also soluble in alcohol. It has been regarded as a stimulating expectorant, but is totally destitute of medicinal efficacy, and the sole consumption of it is in the composition of the paregoric elixirs of the Pharmacopœias, in which, as it has long been an ingredient, it is still retained.

The London College have given a formula for obtaining another vegetable acid, the Citric.

ACIDUM CITRICUM. Citric Acid.

"Take of Lemon Juice, a pint; Prepared Chalk, an ounce, or as much as may be sufficient to saturate the juice; Diluted Sulphuric Acid, nine fluid ounces. Add the chalk to the lemon juice heated, and mix them; then pour off the liquor. Wash the citrate of lime which re-

mains with water, frequently added ; then dry it. To the dried powder add the diluted sulphuric acid ; boil for ten minutes ; express the liquor strongly through linen, and strain through paper. Evaporate the strained liquor so far, that on cooling, crystals shall form. To obtain these crystals pure, dissolve them in water a second and third time ; strain the solution each time ; evaporate, and put it aside to crystallize."

The juice of the lemon consists principally of citric acid, from which, however, as has been already remarked, it is difficult to abstract the mucilaginous and extractive matter, so as to render it capable of being preserved. Hence the process of obtaining the acid in a pure crystallized form, originally proposed by Scheele, has been introduced. The lime of the carbonate of lime, added to the lemon juice, combines with the citric acid, forming an insoluble precipitate, which falls down : this is washed to carry off the adhering vegetable matter, and is submitted to the action of diluted sulphuric acid : the sulphuric acid combines with the lime, and disengages the citric acid ; this, dissolved by the water, is pressed out from the sulphate of lime, and by the evaporation of the solution is brought to crystallize. The crystals are at first of a brownish tinge, from the re-action, it has been supposed, of the sulphuric on the citric acid. By a second or third solution and crystallization they are obtained colourless, or rather white. A slight excess of sulphuric acid, Scheele found to be useful ; and its operation, as Dize has remarked, consists in decomposing a little mucilage or extractive matter, which adheres to the citric acid, and opposes its crystallization. It remains in the residual liquor without rendering the crystals impure.

Citric acid crystallizes in rhomboidal prisms ; it is easily soluble in water, has a taste extremely sour, and reddens deeply the vegetable colours. In its solid state it remains unchanged, and even in solution is not very liable to spontaneous decomposition. It is used, as has already been remarked, as a refrigerant. A grateful

lemonade is prepared from it, by dissolving 30 or 40 grains in a pint of water, with the addition of a little sugar, an agreeable flavour being communicated by a little dried lemon peel having been infused in the water, or a powder formed by rubbing sugar on the fresh lemon being dissolved in it. It is used, too, in forming the common effervescing draught, being mixed with carbonate of soda, and water added. Whether it acts with equal certainty with the recent juice, as a remedy in scurvy, remains to be ascertained.

Acidum muriaticum. Muriatic Acid.

" Take of Muriate of Soda, two pounds; Sulphuric Acid, sixteen ounces; Water, one pound. First expose the muriate of soda in a pot to a red heat for a short time; when cold, put it into a retort. Then pour the acid, mixed with the water, and cold, on the muriate of soda. Distil from a sand-bath with a moderate fire, as long as any acid comes over. The specific gravity of the acid is to that of distilled water as 1170 to 1000."

The process in the other Pharmacopœias is nearly the same, the proportions of the ingredients being different. In the Dublin Pharmacopœia, the same weight of sulphuric acid as of muriate of soda is ordered, and the acid is diluted with an equal weight of water. In the London Pharmacopœia, two pounds of muriate of soda are put into a retort, with a pound and a half of sulphuric acid diluted with a pint and a half of water. It would require comparative experiments to determine the best proportions; but it is not improbable, that in the formula of the Edinburgh College, the proportion of acid is too small, chemists having been formerly led into error in cases similar to this, by supposing, that in decomposing a compound salt by an acid, there is no advantage in adding more of the decomposing acid than is necessary to neutralize the quantity of base which the portion of salt operated on contains, not knowing the influence of quantity in adding to the force of chemical affinity. We now know, that in every case

of this kind the product is increased by employing more of the decomposing agent than is strictly necessary to neutralize the ingredient with which it combines; and that if this excess be not employed, a portion of the compound operated on is not decomposed. I have accordingly observed, in performing the above process, according to the formula of the Edinburgh College, that a portion of undecomposed muriate of soda exists in the residual mass. The cake remaining in the retort is easily dissolved by pouring water on it when the retort is perfectly cold, and its solution is favoured by the excess of acid in its composition.

The London College direct that the sulphuric acid be diluted only with a portion of the water, and that the remaining water be put into the receiver. This is proper, both as abridging the distillation, and assisting the condensation of the acid gas. An apparatus on the construction of Woolfe's, is sometimes employed, but is unnecessary, as a range of two or hree receivers, without tubes immersed in the liquid in each, is sufficient. The advantage of diluting the acid with at least a portion of the water, is, that the rapid effervescence and disengagement of gas produced by the action of the concentrated acid on the muriate of soda is prevented, and the process is rendered more manageable. In the large way the distillation is sometimes performed from an iron pot connected by an earthen head and tube with a range of receivers, the fire being directly applied, and then the concentrated sulphuric acid is poured directly on the muriate of soda to lessen the action on the iron. But the acid prepared in this way, even when the precaution is followed, of coating the inner surface of the pot, is always contaminated with this metal. The yellow colour which the acid usually has, is not always, however, owing to the presence of iron, but is derived sometimes from a little extractive matter adhering to the sea salt, and it is to consume this that the salt is ordered, in the Edinburgh Pharmacopœia, to be exposed to a red heat. The yellow colour may be removed, by

distilling the acid a second time from a little muriate of soda. To the test of the strength of the acid from its specific gravity, the London College have added, that a fluid ounce of it, diluted with water, ought to dissolve, of a pure limestone, half an ounce.

The theory of the process is sufficiently simple. In all cases, where two acids act on one base, this base would be shared between them, in proportions determined by their affinities to it, and their relative quantities. But circumstances may prevent this participation, and cause one of the acids alone to combine with the base, as, for example, the application of a certain temperature, when one of the acids is much more disposed than the other, to assume the elastic form. This happens in the present case. The sulphuric acid exerts an affinity to the soda of the muriate of soda ; this weakens the affinity exerted by the soda to the muriatic acid ; its tendency to assume the elastic form prevails and a portion of it is disengaged, and by the application of heat aided by the quantity of sulphuric acid employed, the decomposition is rendered complete,—or the sulphuric acid combines with the soda, and the muriatic is disengaged ; it is condensed partly by the water which rises with it in vapour, and partly by the water placed in the receivers.

Muriatic acid exists when uncombined in the elastic form, and is incapable of condensation by any cold or pressure hitherto applied to it. But it is rapidly and largely absorbed by water ; the water, at a common temperature, and under a mean pressure, condensing 360 times its volume. When of the strength stated in the Pharmacopœias, the specific gravity of 1.170, it is supposed to contain 22 of real acid, and 78 of water ; it emits pungent vapours of muriatic acid gas on exposure to the air reddens deeply the vegetable colours, tastes extremely sour, erodes even immediately vegetable and animal substances, and exerts considerable chemical agencies. The acid, however, not yielding oxygen readily, can oxidate inflammable and metallic substances, only by enabling

them, by a resulting affinity, to attract oxygen from the water with which it is combined. The decomposition of this acid has been hitherto only imperfectly effected. Galvanism can scarcely be brought to act on it in the elastic form ; and in the liquid state the water only is decomposed. By heating potassium in the gas, rendered as dry as possible, hydrogen is evolved, and in such quantity as to prove that the acid gas retains a very large quantity of water combined with it ; and more lately Mr. Davy has discovered, than when the acid is obtained in combinations, free, or nearly so, from this water, its acidity is suspended, but is immediately restored on the addition of water ;—facts which, in the present state of chemical theory, admit of no satisfactory explanation.

Muriatic acid is applied to no medicinal purpose. It has a place in the Pharmacopœias, merely as being employed in various pharmaceutic processes.

ACIDUM MURIATICUM DILUTUM. Diluted Muriatic Acid. Ph. Dub.

"Take of Muriatic Acid, Distilled Water, each one pound. Mix them."

This is a formula wholly superfluous, as muriatic acid is not employed medicinally, and requires therefore no adjustment to render its exhibition convenient ; and for any pharmaceutic process, it is easy to order its dilution to the requisite extent.

ACIDUM OXYMURIATICUM. Oxymuriatic Acid.

When muriatic acid is distilled from substances capable of affording oxygen easily, it is converted into a species of elastic fluid altogether different in its chemical properties, which is considered as a compound of muriatic acid with oxygen, and is therefore named Oxymuriatic acid. This has been applied to some medicinal purposes, and a process for preparing it has been introduced into the Dublin Pharmacopœia. The compound salt which is formed when this acid is presented to potash, the Oxymuriate of Potash, has also received

a place in the Materia Medica; and the process may be conducted so that it also shall be obtained. The preparations in which the oxymuriatic acid is formed, in the process given by the Dublin College, have been named

AQUA AXYMURIATICO ET AQUA ALKALINA OXYMURIATICA.

"Take of Muriate of Soda, dried, two pounds; Manganese in powder, one pound; Water, Sulphuric Acid, each two pounds. Mix the muriate of soda and the manganese; put them into a matrass, and add the water; then by a convenient apparatus add the sulphuric acid gradually and at intervals; transmit the gas which is disengaged through a solution of four ounces of subcarbonate of potash, in twenty-nine ounces of water. Toward the end of the operation, apply a moderate heat to the matrass. The specific gravity of this liquid is to the specific gravity of distilled water as 1087 to 1000."

"The Oxymuriatic Water (or solution of oxymuriatic acid in water) is prepared by transmitting the superfluous gas of the above process, by a proper apparatus, through a pint of distilled water. The specific gravity of this liquor is to that of distilled water as 1003 to 1000."

When muriate of soda, black oxide of manganese, and sulphuric acid are mingled together, the sulphuric acid combining with the soda disengages the muriatic acid; and the acid, receiving oxygen from the oxide of manganese, is converted into oxymuriatic acid, which assumes the elastic form. If the sulphuric acid is concentrated, its action is rather too rapid, and gives rise to a disengagement of gas not easily regulated; and if any part of the elastic product is forced from the apparatus, it is extremely disagreeable to the operator, from its highly suffocating odour. It is proper therefore to use the acid diluted somewhat, and after the commencement of the operation, to favour its progress by the application of a moderate heat. The proportions of the ingredients recommended by Vauquelin, are four parts of

muriate of soda, one of oxide of manganese, three of sulphuric acid, and two of water. When the combination of the gas, either with water, or with an alkaline solution, is to be effected, it is proper to use the bottles of Woolfe, so as to transmit the gas through the liquid, the first bottle being left empty to collect a little common muriatic acid that distils over, holding oxide of manganese dissolved.

Oxymuriatic acid has been employed to neutralize the agency of contagion, and change the noxious constitution of foul or corrupted air. To Guyton we are indebted for this application of it. It has been successfully applied in fumigating the wards of hospitals, the apartments of a prison, or other situations in which the atmosphere is contaminated by noxious effluvia, and probably is in this respect the most powerful agent we have it in our power to employ. By its chemical agency, it changes the constitution of the greater number of the compound gases, and more particularly of those having carbon and hydrogen as their elements. Noxious effluvia, derived from the decomposition of vegetable and animal matter, which are the usual sources of a corrupted or contagious atmosphere, may be presumed to be of similar constitution, and therefore to be liable to similar decomposition; and accordingly it has been ascertained, that air highly tainted has its purity, so far as is connected with the removal of such effluvia, restored by the diffusion of the vapours of oxymuriatic acid. The usual materials are mingled together, the sulphuric acid being used in its concentrated state, and are distributed in different vessels placed in the apartment designed to be fumigated. The only disadvantage attending the use of it is, that from its suffocating odour, the atmosphere in which it is diffused cannot be breathed; and in some situations, as in hospitals, where the sick cannot be removed, this renders it necessary to substitute the nitrous acid vapour. But where this does not limit its use, the oxymuriatic acid, as more active, is to be preferred. In its pure state, the oxymuriatic acid is not applied to

any other medicinal use, and there is therefore scarcely any necessity for the solution of it in water, which has received a place in the Dublin Pharmacopœia.

The salt obtained by transmitting the oxymuriatic acid gas through a solution of potash, and named the Oxymuriate of Potash, it has already been remarked, has been received into the Materia Medica, and has been employed as an antisyphilitic remedy. This salt is not strictly an oxymuriate, but the compound of an acid containing still more oxygen than the oxymuriatic acid, what has been named the Hyper-oxymuriatic Acid. When the oxymuriatic acid gas is introduced into the alkaline solution sufficiently concentrated, it undergoes a singular decomposition: one portion of it returns to the state of muriatic acid, and combines with part of the alkaline base; the other portion, receiving the oxygen which this had parted with, passes to the state of an acid, having of course a still larger portion of oxygen in its composition than the oxymuriatic acid, and this combines with another portion of the alkali. The former salt, the muriate of potash, being abundantly soluble, remains dissolved; the other, being more sparingly soluble, is deposited in crystalline plates. These form the salt properly named Hyper-oxymuriate of Potash, (Hyper-oxymurias Potassæ.)

These combinations are much influenced by the concentration of the alkaline solution. If it is much diluted, the oxymuriatic acid is absorbed by it, and remains united with the water and the alkali without decomposition; as is evident from the liquor retaining the property of destroying the vegetable colours,—a property belonging to the oxymuriatic acid, but not to the hyper-oxymuriate of potash. It is only when the more powerful action of the alkali on the acid is favoured by concentration, that the decomposition takes place; and Berthollet has supposed, even, that it is much determined by the operation of crystallization itself. The alkaline solution, therefore, into which the oxymuriatic acid gas is transmitted, ought to be of such a strength,

that the hyper-oxymuriate will be formed in it, and crystallize spontaneously. The solution ordered by the Dublin College appears to be too weak, and the liquor obtained by their process probably contains much of the oxymuriatic acid undecomposed. A solution of the proper strength is obtained by dissolving sixteen ounces of sub-carbonate of potash in four pounds of water; and as the disengagement of the carbonic acid, by the action of the oxymuriatic acid, is troublesome, it is better to remove it by previous agitation of the solution with eight ounces of lime. From this solution, when the transmission of the oxymuriatic acid gas is continued for a sufficient length of time, the hyper-oxymuriate crystallizes spontaneously, and the quantity of crystallized salt ought not to be increased by any evaporation of the liquor, as a portion of muriate of potash might crystallize along with it. The crystals are therefore removed. washed with a little cold water, and dried. And when the salt is to be medicinally used, it ought always to be under this crystallized form. The solution ordered in the Dublin Pharmacopœia must be an uncertain preparation.

Hyper-oxymuriate of potash crystallizes in thin quadrangular tables, white, with considerable lustre. Its taste is cool and penetrating. It dissolves in seventeen parts of cold water and in five of boiling water; is fused by heat; and by a higher heat is decomposed, giving out very pure oxygen gas. From the facility with which it parts with oxygen, it acts with much force on inflammable bodies, producing, by mere trituration with them, or percussion, violent deflagrations or detonations.

Its medicinal applications have been already pointed out. When nitric acid was introduced as a remedy in syphilis, the theory which suggested its use led likewise to the employment of hyper-oxymuriate of potash. It was given in a dose of ten grains thrice a day; and from the cases then brought forward, appeared to be superior even to nitric acid in suspending the symptoms of syphilis. It was not however ultimately established in

practice, and as no great advantage appears to be derived from it as an auxiliary to mercury, it is now seldom prescribed.

ACIDUM NITROSUM. Nitrous Acid. *Ph. Ed. Dub.*

"Take of Nitrate of Potash bruised, two pounds; Sulphuric Acid, sixteen ounces. The nitrate of potash being put into a glass retort, pour upon it the sulphuric acid, and distil from a sand-bath with a fire gradually raised, until the iron pot is at an obscure red heat. The specific gravity of this acid is to that of distilled water as 1550 to 1000." The directions in the Dublin Pharmacopœia are nearly the same.

In this process the sulphuric acid combines with the potash, and disengages the nitric acid. The latter acid, however, principally from the agency of the heat, especially towards the end of the distillation when it is necessary to raise it pretty high, suffers a partial decomposition; a small portion of it loses a part of its oxygen, and a quantity of nitric oxide gas is formed; this is absorbed by the nitric acid, and forms the nitrous acid, which is of a yellow or red colour, and fuming, more or less so, according as it is more largely impregnated with nitric oxide, and, according, therefore, to the degree of heat employed in the distillation. The residuum is sulphate of potash, with an excess of sulphuric acid, this excess of acid being necessary to render the decomposition of the nitre complete. The specific gravity of the acid is probably stated too high; the coloured, or what is strictly named Nitrous Acid, being not easily procured of a greater specific gravity than 1.52. It sometimes contains a minute quantity of sulphuric acid and muriatic acid; the first is detected by adding muriate of barytes to the acid diluted with two parts of distilled water, sulphate of barytes being formed; the other is detected by nitrate of silver, muriate of silver being precipitated. When not intentionally added, however, these acids are never present in sufficient quantity to render it unfit for medicinal or pharmaceutical use.

Nitrous acid is extensively employed as a pharmaceutic agent: from the facility with which it parts with oxygen, it is one of the most important, particularly in oxidating and dissolving the metals. Its powers as a tonic and antisyphilitic remedy have been already considered; and indeed, when internally administered, it is necessarily given in the state of nitric acid, being brought to this state by dilution with water. In the state of vapour, it has been employed under the form of fumigation to destroy contagion; the due proportion of nitre and sulphuric acid being mingled together in small earthen cups, which are put in warm sand, and placed in the apartment designed to be fumigated, and though inferior to oxymuriatic acid in power, it has the advantage that it can be applied without requiring the removal of the sick.

Acidum nitrosum dilutum. Diluted Nitrous Acid.

"Take of Nitrous Acid, Water, equal weights. Mix them, avoiding the noxious vapours."

In combining nitrous acid with water, the greater part of the nitric oxide gas, if it is highly charged with it, is disengaged with effervescence; if less is present, it is retained and converted into nitric acid by the oxygen held loosely dissolved by the water. The diluted acid is employed in a number of the chemical processes of the Pharmacopœia, and is convenient, in particular, for the solution of metals, being of that strength at which its action upon them is not too rapid.

Acidum nitricum. Nitric Acid. Ph. Ed.

"Take of Nitrous Acid, any quantity. Put it into a retort, and a receiver being adapted, apply a very gentle heat until the reddest part shall have passed over, and the acid which remains in the retort shall have become nitric acid." The heat is best applied by the medium of a water-bath.

Another process has been given in the London Pharmacopœia for the preparation of nitric acid.

"Take of Nitrate of Potash dried, Sulphuric Acid, each two pounds. Mix them in a glass retort; then distil the nitric acid with the heat of a sand-bath, until red vapours are produced. Lastly, having poured the distilled acid on an ounce of dried nitrate of potash, distil it again in a similar manner. The specific gravity of nitric acid is to that of distilled water as 1500 to 1000. If a piece of limestone be put into a fluid ounce of it diluted with water, seven drachms ought to be dissolved."

The process given in the Edinburgh Pharmacopœia is that which has been usually followed by chemists to convert nitrous into nitric acid. The nitrous acid is merely the nitric holding dissolved a portion of nitric oxide: when heat is applied, the nitric oxide being more disposed than the acid to assume the elastic form, the affinity by which it is retained in combination with it is weakened, and it is disengaged: this affinity, however, so far continues to operate, that it carries a portion of the acid along with it, and it escapes therefore in the state of very deep coloured nitrous acid vapour. The process is thus so far attended with loss, but this is easily obviated by condensing the nitrous acid vapour, by a portion of water put in the receiver, the diluted acid which will thus be obtained being easily applied to use. The heat ought to be applied by a water-bath, this being sufficiently high to expel the nitric oxide gas, and being not too high to produce decomposition of the acid.

It is difficult, however, by this method, to render the acid perfectly colourless, the last portion of nitric oxide, communicating a pale straw colour, being retained by such an affinity, and the volatility of the acid in this state approaching so nearly to that of nitric acid, that the whole may be distilled without the oxide being entirely separated. A more perfect process to obtain perfectly colourless nitric acid, is to distil it from a little black oxide of manganese, which yields oxygen to the nitric oxide.

In the process of the London Pharmacopœia, from the large quantity of sulphuric acid employed to decompose the nitre, the acid is obtained by the first distillation nearly in the state of nitric. The operation of this excess of sulphuric acid, in preventing the partial decomposition which would form nitrous acid, probably depends on two circumstances: one, that from the quantity adding to the force of its affinity, less heat is required to promote the decomposition of the nitre, and the greater part of the nitric acid is thus brought over before it is necessary, in continuing the distillation, to raise the temperature so high as to evolve nitric oxide; the other, that the water of this excess of acid will be volatalized, in the progress of the distillation, and contribute to preserve the constitution of the nitric acid. The influence of the latter circumstance is very well shown by the fact, that the product, instead of being superior in specific gravity to nitrous acid, as concentrated nitric acid is, is inferior, being, as stated in a report made to the College on the products of this process from different proportions of the materials, 1.50, while the nitrous is stated as having been obtained at 1.53. The weight too of the former, from a given quantity of nitre, amounted to four, that of the latter only to three. The relative value of the two is expressed by the quantity of marble they dissolve, that of the nitrous being stated at twenty-one, that of the nitric twenty-nine, expressing probably, (for they are not stated in a very distinct manner), not the relative strengths of equal weights of the two, but the relative strengths of the entire products, from a given weight of nitre. It thus will follow, that though a larger quantity of acid is obtained from the materials, by the mode of conducting the process in the London Pharmacopœia, the acid itself is not in its concentrated state.

Nitric acid is applied to the same purposes as nitrous acid. Medicinally, they must be the same, as the nitrous, by the dilution necessary for its administration, is converted into the nitric. And in their chemical agencies, and therefore in their pharmaceutic applications, they are precisely alike.

Acidum sulphuricum dilutum. Diluted Sulphuric Acid. *Ph. Ed. Lond. Dub.*

"Take of Sulphuric Acid, one part; Water, seven parts. Mix them." The same proportions are given in the Dublin Pharmacopœia. The London College have, without any necessity, altered the proportions both from those of the other Pharmacopœias, and from those which had formerly been ordered in their own Pharmacopœia; they order a fluid ounce and a half of sulphuric acid to be mixed with fourteen fluid ounces and a half of distilled water, giving the proportion by weight of one part of acid, to nearly five and a half of water. The reason given for this change is, that "the mixture will be more conveniently made, and its dose more easily apportioned, than that of the former Pharmacopœia." The absurdity of this is obvious. A mixture of sulphuric acid with water is made just as easily in one proportion as in another, and the dose of the diluted acid, whatever may be its strength, is apportioned with equal facility. Nor is it of any importance to have any relation between the dose of the diluted acid and any particular quantity of the concentrated acid, as the acid in the latter state has never been prescribed internally. It is to be regretted, that the strength of a preparation, to which practitioners have long been accustomed, has been thus unnecessarily changed.

The preparation of Sulphuric Acid being carried on on a large scale, for the purposes of commerce, no process is given for it in any of the Pharmacopœias, nor could it be executed in the shops. It is formed by burning sulphur mixed with from one-eighth to one-tenth of nitrate of potash, in large leaden chambers. By the oxygen afforded by the nitre, the sulphur is enabled to burn slowly, though the chamber be closed so as to admit of a very imperfect circulation of air; and the acid formed is principally the sulphuric, while from the combustion of sulphur in atmospheric air alone, sulphurous acid chiefly is produced. The acid vapours are absorbed by water placed in the bottom of the chamber. This liquor

when sufficiently acidulated, is concentrated by evaporation, and afterwards by boiling it in glass retorts, and an acid is obtained thick and oily in its appearance, colourless and transparent, having a specific gravity of 1850. Formerly this acid was procured from the decomposition of sulphate of iron, the green vitriol of commerce, by heat; and hence the origin of the name, Vitriolic Acid, by which it has been known.

Sulphuric acid prepared in this manner is never perfectly pure. It contains a quantity of sulphate of potash, (the acid combining with a portion of the potash of the nitre,) and sometimes a small portion of sulphate of lead, derived from the action of the acid on the lead of the chamber. From these it is in a great measure purified by dilution with water, the diluted acid being incapable of holding them dissolved, and hence one advantage of the dilution. The dose of the diluted is also more manageable than that of the concentrated acid. As an astringent it is taken to the extent of from fifteen to thirty drops, usually in a cupful of water.

Acidum Sulphuricum aromaticum. Aromatic Sulphuric Acid.

" Take of Alcohol, two pounds; Sulphuric acid, six ounces. Drop the acid gradually into the alcohol. Digest the mixture with a very gentle heat in a close vessel for three days, then add of Bark of Cinnamon bruised, one ounce and a half; of Ginger bruised, one ounce. Digest again in a close vessel for six days; then strain through paper placed in a glass funnel."

The dilution of the acid by the alcohol is in the proportions in which they are mixed in this preparation, such, that little chemical action appears to be exerted during the digestion; an odour somewhat peculiar is acquired, but the acidity is little impaired. The aromatics render it more pleasant, and the preparation may be considered therefore as a grateful one for the exhibition of sulphuric acid. Its dose is thirty drops, given in a cupful of water. It is not unfrequently used in dyspepsia

hæmoptysis, and other diseases in which this acid is employed.

Æther sulphuricus. Sulphuric Ether.

"Take of Sulphuric Acid, Alcohol, of each thirty-two ounces. Pour the alcohol into a glass retort, capable of bearing a sudden heat. Then pour on the acid in an uninterrupted stream. Mix them gradually by frequent and gentle agitation; then immediately distil from a sand-bath, previously heated for this purpose, into a receiver kept cool with water or snow. Let the heat be regulated in such a manner that the liquor may be made to boil as soon as possible, and continue to boil until sixteen ounces have distilled over; then remove the retort from the sand. To the distilled liquor add two drachms of potash; then distil again from a high-necked retort, with a very gentle heat, into a receiver kept cool, until ten ounces have passed over. If to the acid remaining in the retort after the first distillation, sixteen ounces of alcohol be added, and the distillation be repeated, ether will again be produced. And this may be often repeated."

The directions in the other Pharmacopœias, for conducting this process, are nearly the same. In the London Pharmacopœia, the acid is ordered to be added gradually to the spirit, agitating the mixture after each addition; but on account of the rise of temperature as the mixture proceeds, this mode is more difficult than that directed by the Edinburgh College, of mixing the whole acid and alcohol at once, and any loss of ethereal vapour from the sudden action produced by the mixture is very trivial. The direction given by the Dublin College, to heat the spirit to 120°, before adding the acid, must render the making the mixture more difficult and endanger the breaking of the retort from the addition of the dense cold acid.

On mixing equal weights of sulphuric acid and alcohol, a mutual action, marked by an elevation of temperature, and a hissing noise is produced, and a vapour is

disengaged, of a pleasant ethereal smell. On raising the temperature by the application of heat, so as to cause the mixed liquor to boil, ether is formed, and distils over. This continues for a considerable time: towards the end of this stage of the process, the liquid in the retort is capable of sustaining a higher temperature, and along with the ether, there is produced a white vapour, which condenses in streaks having an oily appearance, in the neck of the retort, and this increasing, collects in the form of a dense oily-like fluid, named Oil of Wine, or Ethereal Oil, which falls to the bottom of the receiver. If the heat be continued beyond this, there is a sudden and copious production of sulphurous acid gas, which, not escaping easily from the heavy liquor in the retort, causes it to swell up, and if not removed from the fire, it will pass over into the receiver. The principle nicety, therefore, in conducting the process, is to continue the distillation, so as to obtain the largest produce of ether, without bringing over the liquor from the retort. The rule given in the Edinburgh Pharmacopœia is to continue it, until the liquid condensed in the receiver is equal to half the quantity of alcohol that had been employed; as when this has been obtained, the formation of ether will have nearly ceased. The London College direct the distillation to be continued until the ethereal oil is produced; and if care be taken to guard against the sudden swelling up of the liquor in the retort, this may be done, and rather a larger product obtained. Whenever the neck of the retort becomes obscured with white vapours, the fire should be withdrawn; and if the materials begin to swell, the retort ought to be raised in the sand. The receiver requires to be kept cool by immersion in water, or causing water to trickle over it, in order to promote the condensation of the ether; and care ought to be taken to avoid approaching a burning body to the apparatus as accidents have sometimes happened, when the vessels were not closely luted, from the volatility and inflammability of the ethereal vapour.

There is considerable difficulty in establishing the theory of the formation of ether. As the process proceeds, the liquor in the retort assumes a dark colour, and a quantity of carbonaceous matter, somewhat bituminous, is diffused through it; it is likewise found to be considerably diluted with water, and another portion of water distils over with the ether. These changes, and the formation of the ether, must be referred to changes in the composition of the alcohol; and they were generally supposed to be owing to a portion of oxygen from the acid, being communicated to the hydrogen of the alcohol, and forming water; the balance of affinities being thus broken, part of the carbonaceous matter of the alcohol is likewise separated, and its remaining hydrogen and carbon, with any portion of oxygen it may contain, entering into combination, form the ether. To this theory however, it was some years ago objected by Fourcroy and Vauquelin, that the decomposition of the sulphuric acid is not essential to the formation of ether: it may take place to a certain extent towards the end of the process, when the temperature is high, and the liquor is loaded with carbonaceous matter; but there are no indications of it, they affirm, in the earlier stage, during which principally ether is formed: there is no evolution of sulphurous acid, and if the process be stopt at this stage, it is affirmed by these chemists, that the whole acid is to be found undecomposed, the residual liquid being capable of saturating as much of an alkaline base, as the quantity of sulphuric acid employed would do. They gave, therefore, a different view of the agency of the acid. Instead of communicating oxygen, they suppose it to operate by a disposing, or what would now be named a resulting affinity, causing part of the oxygen and hydrogen of the alcohol to combine and form water; then the equilibrium of affinities being subverted, carbonaceous matter is precipitated from the alcohol, and the new affinities being exerted, ether is the product of the combination of its remaining elements. The subject, however, notwithstanding the researches of

these chemists, is obscure. The fact, with regard to the acid not being decomposed, is not altogether certain; for the non-appearance of sulphurous acid, from which it has been inferred, may be owing to the small quantity evolved combining with the ether; and the power of the liquid to saturate as much of an alkaline base, as the sulphuric acid used in the process could do, may, if any portion of the acid be decomposed, be owing to the formation, by a partial oxygenation of the elements of the alcohol, of acetic or oxalic acid, both of which have been said to exist in the residual liquor. The facts, that those acids form ethers most readily from alcohol, which yield oxygen most readily, and that those which cannot communicate it directly form it with difficulty, and only by arrangements by which oxygen is communicated from some other substance, favour the supposition, that a communication of oxygen from the acid is necessary to the commencement at least of the series of changes.

It is sufficiently proved, however, that the decomposition of the acid is not necessary to any great extent, for the residual liquor is still capable of converting a fresh portion of alcohol into either, and as this is economical, it is ordered in the Pharmacopœias. And its power of doing so appears to diminish progressively, not so much from exhaustion of the acid, as from its becoming too much diluted with water. This water may have either entirely pre-existed in the alcohol; or only partially, and have been in part formed by combination of portions of oxygen and hydrogen; and we have no certain mode of determining which of these is the case. The carbonaceous matter which is precipitated, is obviously derived from the alcohol; and its separation led to the conclusion, that less of this matter must exist in the composition of ether that in than of alcohol; that hydrogen, therefore, predominates in the composition of the former, and to this its greater volatility and levity were ascribed. Both alcohol and ether in burning afford water and carbonic acid, and from the comparative quantities afforded

in the combustion of each, Cruickshank inferred that the proportion of carbon to hydrogen is in ether as 5 to 1 nearly, while in alcohol it is as 8 or 9 to 1. The younger Saussure has more lately endeavoured, from the products of their detonation with oxygen, to discover their composition, and ether, he supposes, to contain more carbon and hydrogen than alcohol, but less oxygen. He states its composition at 59 carbon, 22 hydrogen, and 19 oxygen.

Ether obtained by the first distillation is not pure. It is diluted with a considerable proportion of water, sometimes also it contains alcohol, and very generally a portion of sulphurous acid, which had been evolved towards the end of the distillation. To free it from these is the object of the directions for its rectification inserted in the formula of the Pharmacopœia,—the sixteen ounces of liquid first procured being distilled from two drachms of potash, from a high necked retort, with a very gentle heat, until ten ounces are obtained; the potash detaining the sulphurous acid by the affinity it exerts to it, and rendering the water also less volatile. The same directions are given in the other Pharmacopœia, a portion of water only being ordered to be added to the potash and ether in the London Pharmacopœia, which may be useful by attracting the alcohol more effecually. If the ether of the first distillation be much impregnated with sulphurous acid, from the distillation having been continued longer than usual, it will be useful in the process of rectification to add a little black oxide of manganese, which yielding oxygen to the sulphurous acid, converts it into sulphuric, and abstracts it more effectually than is done by the alkali alone. In the London and Dublin Pharmacopœias, both the Unrectified and Rectified Ether have a place, the Ether, as obtained by the first distillation, being named Æther Sulphuricus in the London Pharmacopœia, and Liquor Æthereus Sulphuricus in the Dublin; and when rectified, Æther Rectificatus in the former, Æther Sulphuricus in the latter. The Edinburgh College, with more propriety, admit of

no distinction, but name the product when rectified, Sulphuric Ether, and sanction its use only in this state.

Sulphuric Ether in a state of purity has a peculiar odour, strong and diffusive, but not pungent; its taste is warm and penetrating; it is colourless and transparent; its specific gravity is 0.732, and when highly rectified is brought so low as .716; it is therefore one of the lightest known liquids. It is also one of the most volatile; it evaporates rapidly at common temperatures; it boils strongly in vacuo, even below 32, and under the atmospheric pressure at 98°. In evaporating it absorbs much caloric; hence, if dropt on the hand it quickly disappears, producing on the spot a sensation of cold; and this affords a very good test of its purity, the volatility being greater, as it is more highly rectified. It is soluble in alcohol in every proportion; in water only in the limited proportion of one part to ten; and this affords another test of its proper preparation, as if more soluble it is diluted either with water or alcohol.

Its medicinal properties have been already considered. It is employed principally as an antispasmodic, being given in a dose from half a drachm to a drachm. And it is sometimes applied externally as a stimulant, or, from the cold attending its evaporation, as a remedy to burns.

Æther sulphuricus cum alkohole. Sulphuric Ether with Alcohol. (Spiritus Ætheris Sulphurici, *Ph. Lond.*)

"Take of Sulphuric Ether, one part; Alcohol, two parts. Mix them together."

A process had formerly a place in the Pharmacopœias, in which sulphuric acid and alcohol were submitted to distillation, more alcohol being employed than the acid could convert into ether. A portion of it, therefore, distilled over unchanged on the first application of the heat, and served merely to dilute the ether that followed. For this preparation which had been received into practice under the name of the Sweet Spirit of Vitriol, the present has been substituted, but it has no peculiar advantage, and is seldom prescribed.

Æther sulphuricus cum alkahole aromaticus. Aromatic Sulphuric Ether with Alcohol. (Spiritus Ætheris Aromaticus, *Ph. Lond.*)

"This is made from the same aromatics, and in the same manner as the Compound Tincture of Cinnamon, unless that in place of Diluted Alcohol, Sulphuric Ether with alcohol, is employed."

The addition of these aromatics to the sulphuric Ether in this formula is of so little importance, that the preparation is scarcely ever used.

To the preceding preparations, the London and Dublin Colleges have added another,—the peculiar oily-like fluid which is produced in the latter stage of the process for forming Ether, the Oil of Wine, as it used to be named.

Oleum æthereum. Æthereal Oil. Ph. Lond.

"The liquor remaining after the distillation of sulphuric ether, distil with a very gentle heat, until a black froth swells up; then immediately remove the retort from the fire. To the liquor which remains in the retort, add water, so that the oily part may float upon it. Draw this off, and mix with it lime-water, as much as may be sufficient to neutralize the acid mixed with it. Lastly, withdraw the etherial oil after it has separated."

A different process is given by the Dublin College to obtain a similar product, which they name

Liquor æthereus oleosus. Oily Ethereal Liquor.

"Take the liquor remaining in the retort after the distillation of sulphuric ether. Distil it with a moderate heat to one half."

The product obtained by these processes is probably the same, being formed in the first process, but not distilled over; in the second, being obtained insulated by distillation, though to conduct this is attended with considerable difficulty, from the re-action of the carbonaceous matter which has been separated from the alcohol, on the sulphuric acid. The nature of this oily substance

has not been well determined. It has been considered as a compound of ether and sulphurous acid, but no proof is given that by the combination of these it can be formed. Fourcroy and Vauquelin have supposed, that it is analogous to ether, differing from it in containing a larger proportion of carbon. It can be formed more directly by distilling ether from sulphric acid. It is thick, unctuous in appearance, less volatile than ether, and soluble both in it and in alcohol. It is applied directly to no medicinal use, but is employed in forming the following preparation:

Spiritus ætheris compositus. Compound Spirit of Ether. Ph. Lond.

"Take of Spirit of Sulphuric Ether, a pint; Ethereal Oil, two fluid drachms. Mix them."

A composition had been in use under the name of Hoffman's Anodyne Liquor, which consisted of alcohol, with a portion of ether and ethereal oil. This, after having been discarded from the Pharmacopœias, has been restored in the present preparation, on the supposition that it possesses superior powers as an anodyne. It probably differs, however, in nothing from ether with alcohol, at least there is no distinct proof of any peculiarity of operation being communicated by the ethereal oil.

Æther nitrosus. Nitrous Ether. Ph. Dub.

"Take of Nitrate of Potash, dried and in coarse powder, one pound and a half; Sulphuric Acid, one pound; Rectified Spirit, nineteen ounces by measure. Put the nitrate of potash into a tubulated retort, placed in a bath of cold water; and add to it gradually, and in small quantities, the sulphuric acid and alcohol, previously mixed and allowed to become cold. Without the aid of any external heat, or with only such a slight degree of it as may be communicated by the addition of a little tepid water to the bath, an ethereal liquor will begin to distil In a short time, the heat of the retort will increase spontaneously, and a considerable ebullition will take place.

which must be moderated by adding a portion of cold water to the bath. The receiver ought also to be kept cold with water or snow, and it ought to be furnished with an aparatus adapted to transmit through a pound of rectified spirit, in a phial kept cold, the highly elastic vapour disengaged suddenly, and with great force, from the mixture, when the heat is raised rather too high. The ethereal liquor thus obtained by spontaneous distillation is to be put into a phial closely stopt with a glass stopper: and to neutralize the excess of acid, as much sub-carbonate of potash in dry powder is to be added as is necessary, closing the phial after each addition, and determining the neutralization by the test of litmus. This is generally attained on the addition of about a drachm of the salt, and in a short time the nitrous ether rises to the surface, and may be withdrawn by a funnel. To obtain the ether in its purest state, distil it from a water-bath, heated to about 140 degrees, to one half. Its specific gravity is to that of distilled water as 900 to 1000."

The process for preparing nitrous ether has always been found extremely difficult, from the great susceptibility of decomposition of the acid, and the rapidity with which it communicates oxygen to the alcohol. Their mutual action, in consequence of this, becomes extremely violent, and it is difficult to add the requisite proportion of nitric acid to convert it into ether, or to do so at least without considerable waste in the dissipation of elastic products. Different arrangements have been contrived to facilitate this, but probably none that can be conducted more easily than that now received into the Dublin Pharmacopœia, originally contrived by Woolfe, and found by Pelletier to succeed better than any other. The addition of the mixture of sulphuric acid and alcohol should be made in small quantities at a time, not exceeding two ounces, and the quantity of product is increased by keeping the first receiver perfectly cool, and connecting with it not merely one bottle, but a range of bottles, containing, according to a

method employed by Thenard, a saturated solution of muriate of soda kept cold by ice, through which the elastic product is transmitted ; it is condensed, and the liquid floats on the surface.

The theory of the formation of nitric ether remains obscure ; the series of changes, however, are obviously altogether different from those which take place in the production of sulphuric ether. The acid is entirely decomposed, or nearly so, scarcely any trace of it having been found by Pelletier in either the distilled or the residual liquor ; there is no precipitation of carbonaceous matter from the alcohol, the liquor remaining transparent, and of a light yellow colour ; it contains oxalic and acetic acids, much diluted with water. Thenard, in his researches on this subject, found, that the elastic fluid disengaged during the process, consists of nitrogen, nitric and nitrous oxide, and carbonic acid gases, holding dissolved ether, and a portion of acid partly nitrous, partly acetic. The nitric ether, which is condensed, has also combined with it nitric and acetic acids ; and when these are abstracted, so that it has no sensible acidity, it acquires this merely on keeping, a proof that the elements of these acids exist in its composition. From the products obtained from its decomposition by transmitting it through an ignited tube, he infers, that 100 parts of it consist of 16.41 of nitrogen, 39.27 of carbon, 34.73 of oxygen, and 9.59 of hydrogen. In its formation, much of the oxygen of the acid appears to combine with the hydrogen of the alcohol, forming water ; a portion of it unites with part of the carbon, forming carbonic acid, and with portions of both producing acetic acid ; a considerable part of the nitrogen of the acid is disengaged in its insulated state, or in the form of nitric and nitrous oxides, and the remaining oxygen and nitrogen combine with the remaining carbon and hydrogen, and form the nitric ether.

Nitric ether is light and volatile ; its colour is usually yellow, probably, however, from the presence of a portion of free nitric acid surcharged with nitric oxide ; its

odour is strong and penetrating, though not so fragrant as that of sulphuric ether; when pure and concentrated its volatility is such, that it instantly evaporates when poured from a phial, and boils at 70° under the common atmospheric pressure; it is highly inflammable: with alcohol it combines in every proportion, but in water it is soluble only in limited quantity, requiring, according to Thenard, when pure, 50 parts for its solution.

This ether has scarcely in its pure form been applied to any medicinal use; though it not improbably is possessed of powers analogous to those of sulphuric ether. Diluted with alcohol with a portion of free acid, it forms the following preparation, which has long had a place in the Pharmacopœias, and is used as a refrigerant and diuretic.

Spiritus ætheris nitrosi. Spirit of Nitrous Ether. (Spiritus Ætheris Nitrici, *Ph. Lond.*—Spiritus Æthereus Nitrosus, *Ph. Dub.*

"Take of Alcohol, three pounds; Nitrous acid, one pound. Pour the alcohol into a large phial placed in a vessel full of cold water, and add the acid gradually, agitating them frequently. Close the phial lightly, and set it aside for seven days in a cool place; then distil the liquor with the heat of boiling water into a receiver kept cold with water or snow, as long as any spirit comes over." In the Pharmacopœia of the London College, a smaller proportion of acid is added, three ounces only to two pints of rectified spirit, and twenty-six ounces are distilled off immediately by a gentle heat.

A preparation of this kind has long been employed in medicine. It consists probably of nitric ether diluted with alcohol, and containing always a portion of free acid. It is not difficult to add the nitric acid to the alcohol in the proportion of one to three parts, at least from this quantity of acid added with precaution, no violent action results. If heat were applied to this mixture however, so as to raise it to 212°, mutual decomposition,

attended with the rapid extrication of elastic products would take place. The heat must therefore be either applied more slowly, or the method ordered by the Edinburgh College must be followed, that of allowing the mixture to stand for some days in a cool place. During this time, a mutual action is exerted between the acid and alcohol; the former is partially decomposed, and the heat required for distillation, can be safely applied. That this decomposition takes place is proved by the experiments of Bayen. He digested an ounce of nitrous acid with two ounces of alcohol for five weeks; the liquor then required for its saturation only 134 grains of an alkaline base, while an ounce of the same acid required to saturate it 282 grains of the same base. And when, after digesting the acid and alcohol together, he submitted them to distillation, on mingling the product and the residual liquor, the whole was capable of neutralizing only 32 grains. By this reciprocal action of the acid and alcohol, a portion of nitric ether appears to be formed; this nitric ether distils over with a considerable portion of unchanged alcohol, and a quantity of free acid. The theory of its production, therefore, so far as relates to the formation of the nitric ether, is the same with that which has been already explained. The propriety of the change which has been made by the London College, in this process, that of diminishing so much the proportion of nitric acid, may be questioned, both as less nitric ether must be formed when the proportion of acid is so small, and as a considerable share of the medicinal efficacy of the preparation probably depends on the free acid.

Spirit of nitric ether has an odour extremely fragrant; its taste is pungent and acidulous; it is volatile and inflammable, soluble readily both in alcohol and in water. It is employed principally as a grateful refrigerant in inflammatory affections, as a diuretic in dropsy, or rather as an auxiliary to promote the operation of more powerful diuretics, and as a stimulant relieving nausea and flatulence. Its dose is 30 or 40 drops taken in a cupful of water

The Dublin College give a formula for the preparation of a spirit of nitrous ether, which must afford a product considerably different from that obtained by the preceding processes, particularly in containing no free acid. The directions are to "add to what remains after the distillation of nitrous ether the rectified spirit of wine which had been employed in the process to condense the elastic vapour, and distil with the highest heat of a water-bath to dryness. Mix this distilled liquid with the alkaline solution remaining after the separation of the nitrous ether, and add also as much dry sub-carbonate of potash as shall be sufficient to neutralize the free acid, ascertaining this by the test of litmus. Lastly, distil this with the mean heat of a water-bath while any liquid comes over. The specific gravity of the distilled spirit is to that of distilled water as 880 to 1000."

By this process, the portion of nitric ether in the residuum of the first distillation is obtained, and the alcohol which had been in part also impregnated with it, is farther changed by the free nitric acid of the residual liquor. The product, therefore, is somewhat analogous to that obtained by the preceding processes. But by the action of the alkali, to which it is afterwards submitted, its acidity must be removed, and to a certain extent this must modify its medicinal powers. The product of the process which has been longest in use, that of the Edinburgh Pharmacopœia, and the powers of which are sufficiently ascertained, is probably that which ought to be preferred.

Carbonas potassæ. Carbonate of Potash. Ph. Ed. (Sub-Carbonas Potassæ, *Ph. Lond.*—Sub-Carbonas Kali, *Ph. Dub.*)

"Let impure Carbonate of Potash be put into a crucible, and exposed to a red heat, that the oily impurities, if any are present, may be burnt out; then having rubbed it with an equal weight of water, mix them thoroughly by agitation. The liquor, after the impurities have subsided, being poured into a clean iron pot, is to be boil-

ed to dryness, stirring the salt constantly towards the end of the boiling, that it may not adhere to the vessel." The directions given in the other Pharmacopœias are essentially the same, except that in the London Pharmacopœia the liquor is not ordered to be evaporated to dryness, but until it become thick; it is then removed from the fire, and stirred with an iron rod, until it concrete into crystalline grains.

The Potash of commerce is obtained by the incineration of the wood of land vegetables; the ashes being lixiviated with water, so as to dissolve the saline matter, and this being evaporated to dryness. The dry mass consists principally of sub-carbonate of potash, with smaller quantities of sulphate and muriate of potash, siliceous earth, and metallic matter, principally oxides of manganese and iron. These are in a great measure abstracted by the present process, the sub-carbonate of potash from its greater solubility being dissolved, while the others, and especially the earthy and metallic matter, from the small quantity of water employed, remain undissolved. It is obtained at least sufficiently pure for medicinal or pharmaceutical use.

This saline matter is in the state of sub-carbonate, and is therefore improperly named in the Edinburgh Pharmacopœia. It is deliquescent, acrid, changes the vegetable colours to a green, and has the general alkaline properties. It consists, according to Kirwan, of about sixty of potash. thirty of carbonic acid, and six of water, with a few grains of sulphate of potash, siliceous and argillaceous earth. It is rarely applied to any medicinal use, but is employed principally as an agent in Pharmacy. A solution of it is inserted in the Dublin Pharmacopœia, under the name of AQUA SUB-CARBONATIS KALI, obtained by exposing the sub-carbonate in a funnel, in the tube of which is a piece of linen, to a humid atmosphere; the solution formed by the water, slowly imbibed from the atmosphere, being received in a vessel beneath. A similar solution, LIQUOR POTASSÆ SUB-CARBONATIS, is obtained, according to a formula

in the London Pharmacopœia, by dissolving a pound of sub-carbonate of potash in twelve ounces of water.

Carbonas potassæ purissimus, *olim, Sal Tartari* Pure Carbonate of Potash, *formerly Salt of Tartar.* (Kali e Tartaro, *Ph. Dub.*)

"Take of impure Super-tartrate of Potash, any quantity. Having wrapped it up in moist bibulous paper, or put it into a crucible, burn it into a black mass, by placing it among live coals. Having reduced it to powder, subject it to a moderate heat, in an open crucible, until it become white, or at least of an ash-gray colour, care being taken that it do not melt. Then dissolve it in warm water; strain the liquor through linen, and evaporate it in a clean iron vessel, stirring the matter constantly towards the end of the evaporation, with an iron spoon that it may not adhere to the bottom of the vessel. A very white salt will remain, which is to be left a little longer on the fire, until the bottom of the vessel is nearly at a red heat. When cold it is to be kept in glass vessels, well stopped." The same directions nearly are given in the Dublin Pharmacopœia, and this salt has also a place in the London Pharmacopœia.

By exposing the super-tartrate of potash to heat, the tartaric acid is decomposed. Part of its carbon and oxygene unite, and form carbonic acid, which is attracted by the potash; and, by continuing the heat, the remaining carbonaceous matter is burnt out. The super-tartrate of potash of commerce usually contains a little tartrate of lime, which, by the heat is converted into carbonate of lime, but by dissolving the saline matter in water, this, and any other earthy substances are separated, and, by evaporation, a salt is obtained, which, like the former, is a sub-carbonate of potash, but more pure. It appears also to contain rather a larger proportion of carbonic acid. The process, however, being more expensive than the preceding one, it is not often to be found in the shops.

Carbonas potassæ. Carbonate of Potash. Ph. Lond.

"Take of Sub Carbonate of Potash, prepared from Tartar, a pound; Carbonate of Ammonia, three ounces; Distilled Water, a pint. Add to the potash dissolved in the water, the carbonate of ammonia; then, by a sand-bath, apply a heat of 180 degrees for three hours, or until the ammonia is expelled, and put the liquor aside that crystals may form. Let the residual liquor be reduced by evaporation, in a similar manner, so that when set aside it may again afford crystals."

The intention of this process is to obtain potash fully saturated with carbonic acid, or in the state of the neutral carbonate, the carbonic acid required for this being abstracted from the ammonia, and the ammonia itself being expelled. The same object is obtained with equal certainty and facility, by transmitting a current of carbonic acid gas through a solution of one part of sub-carbonate of potash, in three of water; and the crystallized salt is obtained probably more pure, as in the former method it is difficult to expel the ammonia entirely. The carbonate crystallizes in quadrangular prisms, which are not deliquescent: they are soluble in four parts of cold water. The taste of this salt is mild, but somewhat alkaline, and it changes the vegetable colours to a green. It is therefore disposed to crystallize with an excess of base, and is, in strictness of chemical language, a sub-carbonate. According to Pelletier, it consists of 40 of potash, 43 of carbonic acid, and 17 of water. It has been proposed to be used in medicine as a diuretic and antacid, in preference to the sub-carbonate, as being milder; and it answers better for preparing the effervescing draught.

Aqua super-carbonatis potassæ. Water of Super-Carbonate of Potash.

"Take of Water, ten pounds; Pure Carbonate of Potash, one ounce; Dissolve, and expose the solution to the current of Carbonic Acid Gas, which arises from

three ounces of powder of Carbonate of Lime, three ounces of Sulphuric Acid, and three pounds of Water, gradually and cautiously mixed. The chemical apparatus invented by Dr. Nooth is well adapted to this preparation. But, if a larger quantity of the solution is required, the apparatus of Woolfe is preferable. The colder the air is, and the greater the pressure, the better will be the liquor. It ought to be kept in vessels well stopt."

Potash, when used as a lithontriptic, excites so much irritation in the stomach and bladder, that its use cannot well be long continued. But, when super-saturated with carbonic acid, as it is in this preparation, it is rendered more pleasant and less irritating; and, though its lithontriptic or real solvent power is diminished, or perhaps entirely lost, it is capable of acting as a palliative, and of being continued for any length of time; and from the observations already made under the class of lithontriptics, it follows, that no greater advantage is to be expected from the use of alkaline remedies under any form. It is taken to the extent of one, or even two pounds in the day. It affords also a grateful antacid. A solution of this kind has been in use for a considerable time; and to establish uniformity in its strength, it is properly inserted by the Edinburgh College as an officinal preparation. When properly prepared, it is pungent and acidulous, and sparkles when poured into a glass. By employing an apparatus, in which strong mechanical pressure can be applied, the solution may be still more impregnated with carbonic acid: it is thus rendered more grateful, and as an antacid, in particular, is perhaps rendered more effectual, the stimulus of the carbonic acid relieving the uneasy sensations connected with acidity of the stomach, while the alkali neutralizes the acid itself.

Aqua potassæ, *vulgo Lixivium Causticum.* Water of Potash.

"Take of newly prepared Lime, eight ounces; Carbonate of Potash, six ounces. Put the lime into an iron

or earthen vessel, with twenty-eight ounces of warm water. The ebullition being finished, immediately add the salt; and the whole being well mixed, close the vessel until they become cold. Let the cold materials, previously well agitated, be poured into a glass funnel, the tube of which is obstructed with clean linen. Cover the upper orifice of the funnel, while the neck of it is inserted in another glass vessel, that the water of potash may gradually drop through the linen into the lower vessel. When it first ceases to drop, pour into the funnel a few ounces of water, but cautiously, so that it may swim above the matter The water of potash will again begin to drop. In this manner the affusion of water is to be repeated, until three pounds have filtered, which will be in the space of two or three days. The upper parts of the liquor are to be mixed with the lower by agitation, and it is to be kept in a vessel well stopt." The directions given in the London and Dublin Pharmacopœias are essentially the same. A test is added to judge of the proper preparation of the solution, that it should be colourless, and scarcely effervesce on the addition of an acid. If on this addition any effervescence should take place, the liquor is to be again digested with a little lime, and filtered in a similar manner.

This process affords a very good example of the action exerted on an acid by two bases having an attraction to it, and of the effect of quantity of matter in influencing the results of chemical affinity. To the carbonic acid combined with the potash, an attraction is exerted by the lime, and by this attraction part of the acid would be withdrawn. A portion of it, however, would still remain united with the potash; and the only mode of counteracting this, and of at least diminishing the quantity, is to increase the proportion of lime acting on the carbonate. From the insolubility of lime, this can scarcely be done in any other mode than that followed in the present process, in which by the arrangement of putting the entire mixture, with a great excess of lime, into a funnel, the tube of which is nearly

obstructed, the alkaline solution must filtrate slowly through the mass of lime. The affinity of the lime to the carbonic acid is thus favored, and the greater part of the acid is abstracted from the potash. Still, however, from the effect of quantity on the force with which affinity is exerted, a small quantity of acid is retained in combination with the potash, which cannot be abstracted by this process. But if the lime has been in a sufficiently active state, and the directions observed so that the filtration has been performed slowly, the quantity is very inconsiderable, as is apparent from scarcely any sensible effervescence being excited by the addition of an acid, and for any medicinal or pharmaceutical purpose to which the solution is applied may be neglected. The agency of the air must be excluded during the filtration, especially from the filtered liquid, to prevent absorption of carbonic acid; and for the same reason it must, after it is prepared, be kept in glass vessels well stopt. Its specific gravity is to that of distilled water as 1220 to 1000. The medicinal applications of the alkali under this form have been already considered.

Potassa, *olim Causticum Commune Acerrimum.* Potash. (Potassa Fusa, *Ph. Lond.*—Kali Causticum, *Ph. Dub.*)

" Take of Water of Potash, any quantity. Evaporate it in a covered clean iron vessel, until when the ebullition is finished, the saline matter flow smoothly like oil, which will happen before the vessel is at a red heat. Then pour it on a clean iron plate ; cut it into small masses before it hardens, and immediately put them into a phial well stopt."

By the dissipation of the water, the alkali is obtained in a solid form ; it is usually run into moulds, so as to be formed into cylindrical pieces. Under this form it is used as a caustic ; it quickly erodes animal matter, and, mixed with soap into a paste, is sometimes used to open an ulcer.

Potassa cum calce, *olim Causticum Commune Mitius.* Potash with Lime. (Potassa cum Calce, *Ph. Lond.*—Kali Causticum cum Calce, *Ph. Dub.*)

"Take of Water of Potash, any quantity. Evaporate it to one-third in a covered iron vessel; then mix with it as much newly slacked lime as may be sufficient to give it the consistence of a solid paste, which is to be kept in a stopt vessel."

As a caustic, this is milder than the former preparation, and it has the advantage of being less deliquescent, so that it can be more easily confined to the part to which it is applied. When mixed, however, with the requisite quantity of soap to form a paste, it is scarcely sufficiently active.

Acetis potassæ. Acetite of Potash. (Potassæ Acetas, *Ph. Lond.* Acetas Kali, *Ph. Dub.*)

"Take of Pure Carbonate of Potash, one pound. Boil it with a gentle heat in four or five times its weight of Distilled Acetous Acid, and add more acid at different times, until, on the watery part of the former portion being nearly dissipated by evaporation, the acid newly added excite no effervescence: this will happen when about twenty pounds of acid have been consumed. Afterwards evaporate to dryness slowly. Let the remaining impure salt be liquefied with a gentle heat, for a short time; then dissolved in water, and strained through paper. If the liquefaction has been properly done, the strained liquor will be limpid; if not, of a brown colour. Afterwards evaporate with a very gentle heat this liquor, in a shallow glass vessel, stirring the salt while it concretes, that it may more quickly be brought to dryness. Lastly, the acetite of potash ought to be kept in a glass vessel, well closed, that it may not liquefy by the action of the air."

In this process, the acetic acid of the distilled vinegar combines with the potash, disengaging the carbonic acid. The acetate of potash, obtained by the evaporation, is liable to be of a brownish colour, from the pre-

sence, probably, of a little extractive matter derived, from the vinegar. It is freed from this, either by boiling the solution with charcoal powder; or, as directed in the Pharmacopœia, by melting the salt; and, by the second solution and evaporation, it is obtained in the form of a white foliated mass; the foliated structure which is very characteristic of this salt, arising from a species of crystallization it suffers.

Acetate of potash is extremely deliquescent, becoming humid in a very short time from exposure to the air. It does not require more than its weight of water for its solution, at the temperature of 60°: it was at one time celebrated as a diuretic, in a dose of one or two drachms; but it has now nearly fallen into disuse.

SULPHAS POTASSÆ, *olim Tartarum Vitriolatum.* Sulphate of Potash. (Potassæ Sulphas, *Ph. Lond.*—Sulphas Kali, *Ph. Dub.*)

"Take of Sulphuric Acid, diluted with six times its weight of Water, any quantity. Put it into a large glass vessel, and gradually drop into it, of Carbonate of Potash, dissolved in six times its weight of Water, as much as may be necessary to the perfect saturation of the acid. The effervescence being over, strain the liquor through paper; and, after due evaporation, put it aside, that crystals may form. Sulphate of Potash may also be conveniently made, by dissolving the residuum of the distillation of Nitrous Acid in Warm Water, and saturating it by adding Carbonate of Potash."

In the former of these processes, the sulphuric acid unites with the potash of the carbonate of potash, and expels the carbonic acid with effervescence, the sulphate of potash remaining in solution. The second process being more economical, is that which is always followed, and it is it which has a place in the other Pharmacopœias. The salt remaining after the distillation of nitrous acid, is sulphate of potash, with a considerable excess of sulphuric acid: this excess of acid is neutralized by the potash of the carbonate of potash. The neutral salt forms only in small crystals, the figure of

which is a six-sided prism, acuminated by six planes: by slow evaporation they are obtained of a larger size. They require seventeen parts of cold water for their solution. The taste of the salt is bitter. Its powers are those of a cathartic, in the dose of half an ounce; but it is more usually given in smaller doses as an aperient, and, from its sparing solubility, is given usually in powder.

SULPHAS POTASSÆ CUM SULPHURE, *olim Sal Polychrestus.* Sulphate of Potash with Sulphur. Ph. Ed.

"Take of Nitrate of Potash in powder, Sublimed Sulphur, equal weights. Throw them well mixed together, in small quantities at a time, into a red-hot crucible. The deflagration being finished, let the salt cool, and keep it in a glass phial well stopt."

The nitrate of potash being decomposed at a red heat, affords oxygen to the sulphur, in such proportions as to convert it principally into sulphuric, and partly into sulphurous acid. Both acids are attracted by the potash; and it appears even that from the rapidity of the deflagration, a portion of the sulphur escapes oxygenation, and remains united with a portion of the alkali. This is therefore a mingled product. In its medicinal qualities, it does not appear to differ from the sulphate of potash; and it is soon converted into it, by exposure to the air. Hence it is little used.

POTASSÆ SUPER-SULPHAS. Super-Sulphate of Potash. Ph. Lond.

"Take of the salt which remains after the distillation of Nitric acid, two pounds; Boiling Water, four pints. Mix them, so that the salt may be dissolved, and strain. Then boil the solution until a pellicle appear on its surface, and put it aside that crystals may form. The liquor being withdrawn, dry these on bibulous paper."

By solution in water, the free acid of the residual mass is in part removed, but the salt still crystallizes with an excess of acid. It is much more soluble than

the neutral sulphate, but it is not very apparent to what medicinal use it can be applied, with any peculiar advantage.

TARTARIS POTASSÆ, *olim Tartarim Solubile.* Tartrite of Potash. (Potassæ Tartras, *Ph. Lond.*—Tartaras Kali, *Ph. Dub.*)

"Take of Carbonate of Potash, one pound; Super-Tartrite of Potash, three pounds, or as much as may be necessary; Boiling Water fifteen pounds. To the carbonate of potash dissolved in the water, add, by small quantities, the Super-Tartrite of Potash rubbed to a fine powder, as long as it excites effervescence, which generally ceases before three times the weight of the carbonate of potash have been thrown in. Then strain the liquor when cold, through paper; and, after due evaporation, put it aside that crystals may form."

The excess of tartaric acid in the super-tartrate of potash, is in this process saturated by the potash of the carbonate of potash, and the proper neutral salt is formed. Though ordered to be crystallized in all the Pharmacopœias, the crystallization of it can scarcely be accomplished by hasty evaporation. In its preparation, therefore, the solution is usually evaporated to dryness, and it is kept in powder in the shops.

This salt has a bitter taste; it is very soluble in water, requiring only four parts of cold water for its solution; and from this greater solubility compared with that of the super-tartrate, it derived its name of Soluble Tartar. Even the weaker acids decompose it partially, and reduce it to the state of super-tartrate. As a purgative, it is given in the dose of one ounce.

SULPHURETUM POTASSÆ, *olim Hepar Sulphuris.* Sulphuret of Potash. (Potassæ Sulphuretum, *Ph. Lond.*—Sulphuretum Kali, *Ph. Dub.*)

"Take of Carbonate of Potash, Sublimed Sulphur, of each eight ounces. Having rubbed them together, put them into a large coated crucible; and a cover being adapted to it, apply the fire to it cautiously, until they

melt. The crucible, after it has cooled, being broken, remove the sulphuret, and preserve it in a phial well stopt." The formula in the Dublin Pharmacopœia is the same; but in the London Pharmacopœia the proportions are very different, one ounce of sulphur being heated in a covered crucible with five ounces of sub-carbonate of potash, until they unite: the advantage supposed to be derived from this large proportion of alkali, is, that the whole sulphur is rendered soluble in water.

During the fusion of the two substances, the sulphur and potash combine, and the carbonic acid is disengaged, only partially, however, and hence the combination is less perfect than when the sulphur is melted with the pure alkali. The compound is easily fusible, and is of a yellowish, green or brown colour, and inodorous, but becomes fœtid when moistened or dissolved in water from partial decomposition, and the production of a compound of sulphur and hydrogen. It has been proposed to be used as an antidote to some of the metallic poisons, from the supposition that the sulphur will combine with the metallic preparation, and render it inert. From a similar theory, it has been imagined that it might obviate the effects of mercury on the system when these are too violent: but it is very seldom had recourse to with either intention, and it is doubtful if much advantage would be derived from it. The dose in which it has been proposed to be given is from ten to twenty grains, three or four times a day. It is said, in some cases of cancer, to have increased the efficacy of cicuta as a palliative, in doses of five grains.

AQUA SULPHURETI KALI. Water of Sulphuret of Potash. Ph. Dub.

"Take of Sublimed Sulphur, half an ounce; of Water of Potash, nine ounces. Boil them together for ten minutes, and filter the liquor through paper. Keep it in phials closely stopt. The specific gravity of this liquor is to that of distilled water as 1120 to 1000."

The alkali in its pure form, and in this state of solu-

tion, acts readily on the sulphur and dissolves it, the liquor being of a dark yellow or red colour. It is not merely, however, a solution of sulphuret of potash in water; for whenever sulphur is combined with an alkaline base, it partially decomposes water, and in the state of solution, therefore, a new compound is formed. The nature of their re-action is somewhat complicated. A portion of the sulphur attracts a portion of the oxygen of the water, and the sulphuric acid thus formed is combined with a part of the alkaline base. The hydrogen of the decomposed water enters into union with the remaining sulphur, forming the compound with excess of sulphur, named Super-Sulphuretted Hydrogen, and this remains combined with the rest of the base, forming what some chemists have named a Hydroguretted Sulphuret,—what may be distinguished by the less harsh appellation of a Sulphuretted Hydro-sulphuret. The solution, as prepared by the above formula, is adapted to the same uses as the sulphuret of potash.

Carbonas sodæ. Carbonate of Soda. (Carbonas Sodæ, *Ph. Dub.*—Sub-Carbonas Sodæ, *Ph. Lond.*)

"Take of impure Carbonate of Soda, any quantity. Bruise it, and boil it in water until all the saline matter is dissolved. Strain the solution through paper, and evaporate it in an iron vessel, so that on cooling crystals shall form."

The barilla of commerce, from which this salt is ordered to be prepared, is the residual matter of the combustion of marine plants. It is a very impure carbonate of soda, containing large quantities of other saline and earthy matter, chiefly sulphate and muriate of soda, lime, magnesia, argil and silex, with charcoal. The subcarbonate of soda crystallizing readily, the solution on being evaporated affords it nearly pure in the crystals which first form. The residual liquor, containing more of the other salts, ought to be rejected, a direction properly given in the formula of the London Pharmacopœia. From three to five ounces of the crystallized salt are obtained from a pound of barilla.

This crystallized salt, though mild to the taste, is still sensibly alkaline, and it changes the vegetable colours to a green. It is therefore, in the strictness of chemical nomenclature, a sub-carbonate, as the London College have named it. It crystallizes in octohedrons; its crystals are efflorescent; they require not more than twice their weight of cold water for their solution; and by a heat inferior to that of 212° are liquefied by the action of the very large quantity of water of crystallization they contain. Its quantity amounts to 64 parts in 100, with 21.6 of soda, and 14.4 of carbonic acid. The use of this salt as a lithontriptic has been already stated; and for its more convenient exhibition, it is ordered in the London and Dublin Pharmacopœias to be kept dried.

SODÆ SUB-CARBONAS EXSICCATA. Dried Sub-carbonate of Soda, *Ph. Lond.*—(Carbonas Sodæ Siccatum, *Ph. Dub.*)

"Take of Sub-carbonate of Soda, a pound. Submit it to the heat of boiling water in a clean iron vessel until it is perfectly dry, stirring it constantly with an iron spathula. Then rub it into powder."

Carbonate of soda has been given as a lithontriptic, principally mixed with soap under the form of pill. If the crystallized salt be used, besides the addition to its bulk from the water of crystallization, it effloresces, so that the pill prepared from it soon loses its cohesion. The dried carbonate is therefore preferable; and from the moderate heat to which it is exposed in the drying, the water merely is expelled.

SODÆ CARBONAS. Carbonate of Soda. Ph. Lond.

"Take of Sub-carbonate of Soda, a pound; Sub-carbonate of Ammonia, three ounces; Distilled water, a pint. To the sub-carbonate of soda dissolved in the water, add the ammonia; then by a sand-bath apply a heat of 180° for three hours, or until the ammonia is expelled, and put it aside, that crystals may form. Let the remaining liquor be evaporated in a similar manner, and put aside, that crystals may again be produced."

The sub-carbonate of soda will in this process receive carbonic acid from the carbonate of ammonia, and be brought to the neutral state, while the ammonia will be expelled by the heat. The same neutralization might be effected more directly and economically, by transmitting a current of carbonic acid gas through the solution of the sub-carbonate. The salt in this state, however, does not appear to possess any particular advantage for medicinal or pharmaceutical use.

AQUA SUPER-CARBONATIS SODÆ. Water of Super-Carbonate of Soda. Ph. Ed.

"This is to be prepared from ten pounds of Water, and two ounces of Carbonate of Soda, in the same manner as the Water of Super-Carbonate of Potash."

The proportion of the carbonate to the water is greater in this preparation than in that of the super-carbonate of potash water; but this is owing to the carbonate of soda containing so much water of the crystallization, that even with the enlarged proportion, there is not more real alkali in the one than in the other. The super-carbonated soda water is used as a lithontriptic in the same dose as the super-carbonated potash water, and is usually preferred, on the supposition of being more pure and mild.

TARTRIS POTASSÆ ET SODÆ, *olim Sal Rupellensis.* Tartrite of Potash and Soda. (Soda Tartarizata, *Ph. Lond.*—Tartaras Sodæ et Kali, *Ph. Dub.*)

"This is prepared from Carbonate of Soda and Super-Tartrate of Potash, in the same manner as Tartrate of Potash."

The excess of tartaric acid in the super-tartrate of potash, being saturated in this preparation by the soda of the carbonate of soda, a triple salt is formed properly named by the Edinburgh College, Tartrate of Potash and Soda. It crystallizes in rhomboidal prisms; is soluble in five parts of water at 60°, and has a bitter saline taste. It consists, as Vauquelin has stated its composi-

tion, of 54 parts of tartrate of potash, and 46 of tartrate of soda. It is employed as a cathartic, in the dose of one ounce; and is often preferred, as being less disagreeable than the greater number of the saline cathartics.

PHOSPHAS SODÆ. Phosphate of Soda. (Phosph. Sodæ, *Ph. Dub.*)

"Take of Bones, burnt to whiteness, and reduced to powder, ten pounds; Sulphuric Acid, six pounds; Water, nine pounds. Mix the powder in an earthen vessel with the sulphuric acid; then add the water, and again mix them. Keep the vessel in the vapour arising from boiling water for three days; at the end of which, dilute the matter, by adding other nine pounds of Boiling Water, and strain through a strong linen cloth, pouring over it gradually, boiling water, until the whole acid is washed out. Put aside the strained liquor, that the impurities may subside, from which pour it off, and, by evaporation, reduce it to nine pounds. To this liquor, again poured off from the impurities, and heated in an earthen vessel, add Carbonate of Soda dissolved in warm water, until the effervescence cease. Then strain, and put it aside, that crystals may form. These being removed, add, if necessary to the liquor, a little Carbonate of Soda, that the phosphoric acid may be exactly saturated; and prepare it, by evaporation, again to form crystals, as long as these can be produced. Lastly, let the crystals be kept in a vessel well stopt."

The white residuum of burnt bones consists chiefly of phosphate of lime. The sulphuric acid partially decomposes it, by combining with the lime; the phosphoric acid which is disengaged, in conformity to the law of chemical attraction, that quantity of matter influences affinity, and that in all cases where two acids act on a base, there is a participation of this base between them, in proportions determined by their respective quantities and affinities, retains a quantity of lime combined with it, forming a soluble compound. When carbonate of soda is added to the acidulous liquor obtained by washing the materials, the soda combines

with the free phosphoric acid, and the lime retaining as much phosphoric acid in combination as forms neutral phosphate of lime, is precipitated; the phosphate of soda crystallizes on evaporation of the strained liquor. Its crystals are rhomboidal prisms, and are obtained of a regular figure only in crystallizing with a slight excess of alkali. Hence the liquor should be slightly alkaline; and from the tendency of the salt to crystallize with an excess of base, it is necessary, though the neutralization may have been perfect, to add, previous to the second crystallization, a little carbonate of soda. The crystals are efflorescent; they are soluble in little more than three parts of cold, and in half that quantity of boiling water. They consist, according to Thenard, of 19 of soda, 15 of acid, and 66 of water. The taste of this salt is purely saline, without any bitterness; its medicinal operation is that of a mild cathartic, and, from being less nauseous to the taste than the other salts, it is entitled to preference. Its dose is one ounce, given generally dissolved in six ounces of tepid water, or soup.

SULPHAS SODÆ, *olim Sal Glauberi.* Sulphate of Soda. (Sulphas Sodæ, *Ph. Lond. Dub.*)

"Dissolve the acidulous Salt, which remains after the distillation of muriatic acid, in Water; and add to it, Carbonate of Lime in powder, to remove the superfluous acid. Put it aside until the impurities have subsided; then having poured off the liquor, and strained it through paper, reduce it by evaporation, that crystals may be formed." The London College order the excess of sulphuric acid to be neutralized by carbonate of soda, but it is more economical to use carbonate of lime. Slacked lime is preferable to either, as it decomposes a little muriate of iron, which adheres to the salt.

In the decomposition of muriate of soda by sulphuric acid, to prepare muriatic acid, more sulphuric acid is used than is necessary merely to saturate the soda, advantage being gained from its quantity adding to its affinity, as has been already explained; hence the ne-

cessity of removing the excess of acid in the residual mass, to obtain the neutral sulphate. This salt is also obtained as a residuum in some other processes, particularly in the preparation on a large scale of muriate of ammonia, the Sal Ammoniac of commerce. It crystallizes in hexhaedral prisms; they are efflorescent and soluble in rather less than three parts of cold water. They consist of 18.48 of soda, 23.52 of acid, and 58 of water. This salt has long been in use as a cathartic; it operates with sufficient power and certainty, but is liable to occasion nausea, from its very bitter taste. Its medium dose is an ounce and a half.

CARBONAS AMMONIÆ, *olim Ammonia Præparata.* Carbonate of Ammonia. (Carbonas Ammoniæ, *Ph. Lond. Dub.*)

"Take of Muriate of Ammonia, one pound; Carbonate of Lime, commonly called Chalk, dried, two pounds. Each being separately reduced to powder, mix them, and sublime from a retort into a receiver kept cold."

In this process the muriatic acid of the muriate of ammonia combines with the lime of the carbonate of lime, and the carbonic acid of the latter unites with the ammonia of the former; the exertion of these new affinities being determined by the heat applied. The carbonate of ammonia which is formed is sublimed, and is obtained in a crystalline cake. When the process is carried on in the large way, the sublimation is generally performed from an iron pot, to which the heat is directly applied, and which is connected with a large earthen or leaden receiver. The Dublin College, in place of carbonate of lime, direct carbonate of soda to be used; with this the application of so high a heat will not be required; but not being sufficiently economical, the direction will not be attended to by the practical chemist.

According to the experiments of Mr. Davy, carbonate of ammonia varies in the proportions of its ingredients according to the heat applied in its preparation;

they vary so much as from 20 to 50 parts of ammonia in 100, the ammonia being in larger proportion, as the temperature at which the carbonate has been formed is high; that formed at a temperature of 300° containing 50 parts of alkali, while that produced at a temperature of 60° contains only 20 parts. Still in all these proportions the product is a sub-carbonate; its smell is pungent and ammoniacal, and it changes the vegetable colours to a green: It is very volatile, abundantly soluble in water, and is efflorescent on exposure to the air. Its medicinal uses are as a stimulant applied to the nostrils in fainting, and as a stimulant and diaphoretic, taken internally, in a dose of from five to fifteen grains.

Aqua carbonatis ammoniæ, *olim Aqua Ammoniæ.* Water of Carbonate of Ammonia. (Aq. Carbonatis Ammoniæ, *Ph. Dub.*)

"Take of Muriate of Ammonia, Carbonate of Potash, of each sixteen ounces; Water, two pounds. To the salts, mixed and put into a glass retort, add the water; then distil from the sand-bath with a fire gradually raised to dryness." The Dublin College give the same process with the substitution of Carbonate of Soda for carbonate of potash, by which probably a larger quantity of carbonic acid will be combined with the ammonia.

In this preparation of carbonate of ammonia by the humid way, carbonate of lime, from its insolubility could not be employed to decompose the muriate of ammonia, as it is in the drv way; an alkaline carbonate is therefore employed. The alkali, whether potash or soda, attracts the muriatic acid, while the ammonia combines with the carbonic acid. The carbonate of ammonia is volatilized and dissolved by the watery vapour. The solution is applied to the same medicinal purposes as the concrete ammoniacal carbonate, and is generally preferred for internal use.

A formula is given by the London College for a similar preparation, under the name of Liquor Carbonatis Ammoniæ, obtained by the solution of the solid carbonate in water. Eight ounces of the carbonate of ammo-

nia are dissolved in a pint of distilled water, and the solution is strained through paper.

LIQUOR VOLATILIS CORNU CERVI. Volatile Liquor of Hartshorn. Pharm. Dub.

"Take of Hartshorn, any quantity. Put it into a retort, and distil, with a heat gradually raised, a volatile liquor, salt, and oil. Distil the volatile liquor repeatedly until it become limpid as water, separating, after each distillation, the salt and oil by filtration. The liquor will be purified more easily, if, after each distillation except the first, there be added to it a sixth part of its weight of charcoal, previously made red hot, extinguished by being covered with sand, and reduced to powder while hot. If hartshorn cannot be procured in sufficient quantity, the bones of any land animal may be employed in its place."

This is a process which has long been employed in Pharmacy. The animal matter, principally the gelatin of the bones, at an elevated temperature suffers decomposition, and its principles enter into new combinations, forming chiefly carbonate of ammonia and empyreumatic oil. These are the products of the process; the carbonate of ammonia being partly dissolved by the water which distils over, and obtained partly in a concrete state. It is always contaminated, however, with the empyreumatic oil, which renders it nauseous; and though at one time it was supposed, from this impregnation, to be possessed of some peculiar virtues, this probably had no just foundation, and it is now rejected from practice. If sublimed from charcoal powder, the oily matter is completely removed; but then it differs in nothing from the carbonate of ammonia obtained by the preceding processes, and the process, with these repeated operations, is not more economical.

AQUA AMMONIÆ, *olim Aqua Ammoniæ Causticæ.* Water of Ammonia. (Liquor Ammoniæ, *Ph. Lond.*—Aqua Ammoniæ Causticæ, *Ph. Dub.*)

"Take of Muriate of Ammonia, one pound; Lime, recently prepared, a pound and a half; Distilled Water, one pound; Water, nine ounces. Pour the water upon the lime bruised in an iron or earthen vessel, closing the vessel until the lime, having fallen into powder, has become cold; then mix the muriate, rubbed to very fine powder, with the lime, rubbing them together in a mortar, and then put them into a retort of the coarser glass, *(bottle glass.)* Let the retort be placed in a sand-bath, and connect with it properly the apparatus of Woolfe. In the first bottle, of smaller size than the others, furnished with a tube of safety, put two ounces of distilled water; and in the second vessel what remains of the distilled water. Then apply the fire, increasing gradually until the bottom of the iron pot is at a red heat, and as long as the ammonia is produced. Mix the liquor from both bottles, and let it be kept in small phials well stopt." The directions in the London Pharmacopœia for conducting this process are nearly the same, except that the lime, without being previously slaked, is reduced to powder, and mixed with the muriate of ammonia, and to this mixture put into a retort, a pint of water is added; the lime will then be slaked, but it must be with some risk of the retort breaking from the sudden heat, and the ammoniacal gas must also be very rapidly disengaged. In the formula given by the Dublin College, a large quantity of water is mingled with the materials in the retort, and a portion only of this is drawn off by distillation, impregnated with the whole of the ammonia.

In these processes, the lime combines with the muriatic acid of the muriate of ammonia, and the ammonia is disengaged. Being permanently elastic, it is condensed only by combination with the water, and this is effected either by distilling water at the same time from the materials, or by transmitting the ammoniacal gas through

water. The Edinburgh and London Colleges have preferred the latter mode, and they obtain a solution in this way, perhaps more strongly impregnated; the other mode is rather more easily conducted, and affords a product sufficiently strong for any medicinal or pharmaceutical purpose. On a large scale, an iron still is employed, into which the materials are put, and to which the fire can be directly applied; the head of the still being connected with a spiral tube placed in a refrigeratory, to the extremity of which, besides the recipient to collect the condensed product, two or three receivers are adapted, containing water to absorb any ammoniacal gas.

Water, under a common atmospheric pressure, and at a temperature below 50°, absorbs about one-third of its weight of gas; and by this combination its specific gravity is diminished, that of the saturated solution being not more than 9054. It is seldom so completely impregnated. By following the mode directed by the Dublin College, which is that usually followed, the solution is obtained of the specific gravity of 936; and when of this strength, it contains about 16 of ammonia in 100 parts. Its smell is strong and pungent; its taste extremely acrid, and it inflames the skin. Though its odour is pungent, it ought to be free from any fœtor. It is employed in medicine as a stimulant and diaphoretic, internally, in a dose from twenty to thirty drops, and sometimes as an emetic in a larger dose diluted with water. Externally it is used as a stimulant applied to the nostrils, and as a rubefacient.

Alcohol ammoniatum, *olim Spiritus Ammoniæ.* Ammoniated Alcohol. (Spiritus Ammoniæ, *Ph. Lond. Dub.*)

"Take of Alcohol, thirty-two ounces: recently Prepared Lime, twelve ounces; Muriate of Ammonia, eight ounces; Water, eight ounces. From these, prepare the Ammoniated Alcohol in the same manner as the water of ammonia, and preserve it in a similar manner.

This compound used formerly to be prepared by decomposing the muriate of ammonia by sub-carbonate of

potash, and this method is still retained in the Dublin Pharmacopœia. The result of it was, that as carbonate of ammonia is not soluble in alcohol, either the alcohol was impregnated with the portion of ammonia only disengaged by the operation of the excess of alkali in the sub-carbonate on the muriate of ammonia, or that the distillation was carried so far, as to bring over with the alcohol a quantity of water sufficient to dissolve the carbonate of ammonia which had been produced. The Edinburgh College having substituted lime, it disengages the ammonia from the muriate of ammonia altogether in its pure form, and the ammoniacal gas is condensed by the alcohol. The London College order it to be prepared merely by mixing two parts of rectified spirit, and one of water of ammonia; but in this way the alcohol is considerably diluted. Ammoniated alcohol has the pungent smell, and retains all the powers of ammonia. It is used principally as the menstruum of some vegetables with which ammonia coincides in medicinal operation.

Alcohol Ammoniatum aromaticum, *olim Spiritus Ammoniæ Aromaticus.* Aromatic Ammoniated Alcohol. (Spiritus Ammoniæ Aromat. *Ph. Lond. Dub.*)

"Take of Ammoniated Alcohol, eight ounces; Volatile Oil of Rosemary, one drachm and a half; Volatile Oil of Lemon, one drachm. Mix them so as to dissolve the oils." In the London Pharmacopœia, oil of cloves is ordered in place of oil of rosemary; and in the Dublin, half an ounce of nutmeg, with two drachms of oil of lemons, are digested with two pounds of spirit of ammonia, and afterwards a pound and a half distilled off.

By this combination of ammonia with alcohol, and the addition of the aromatic oils, it is rendered more grateful than the water of ammonia. This preparation is therefore frequently used in preference to the other, as a stimulant in languor or faintness, or to relieve flatulence. Its dose is from fifteen to thirty drops.

Alcohol ammoniatum foetidum, *olim Spiritus Ammoniæ Fœtidus.* Fœtid Ammoniated Alcohol. (Spiritus Ammoniæ Fœtidus, *Ph. Lond. Dub.*)

"Take of Ammoniated Alcohol, eight ounces; Assafœtida, half an ounce, Let them digest in a close vessel for twelve hours; then distil eight ounces by the heat of boiling water."

The impregnation of the ammoniated alcohol with part of the assafœtida in this process, though it may communicate a fœtid smell, can add little to its activity; and accordingly, though it has a place in all the Pharmacopœias, it is not found in the shops. It has been given in hysteria in a dose of thirty drops.

Spiritus ammoniæ succinatus. *Pharm. Lond.* Succinated Spirit of Ammonia.

"Take of Mastich, three drachms; Alcohol, nine fluid drachms; Oil of Lavender, fourteen minims; Oil of Amber, four minims; Water of Ammonia, ten fluid ounces. Macerate the mastich in the alcohol, so that it may be dissolved, and pour off the clear solution; add to this the other ingredients, and mix them all by agitation."

Spirit of ammonia, impregnated with oil of amber and some other essential oils, had been in use as a stimulating perfume under the name of Eau de Luce. A composition had been introduced into the London Pharmacopœia, as a substitute for this, which had not, however, its usual milky appearance. This is given in the present formula by the addition of the mastich, the resinous matter of which is separated by the water, but retained in a state of suspension, probably by the action of the alkali.

Aqua acetitis ammoniæ, *vulgo Spiritus Mindereri.* Water of Acetate of Ammonia. (Liquor Ammoniæ Acetatis, *Ph. Lond.*—Aqua Acetatis Ammoniæ, *Ph. Dub.*)

"Take of Carbonate of Ammonia, any quantity. Pour upon it as much distilled acetous acid, as may be sufficient to saturate the ammonia exactly."

The acetic acid of the distilled vinegar combines with the ammonia of the carbonate of ammonia, disengaging the carbonic acid with effervescence; and the acetate of ammonia being a very soluble salt, remains dissolved in the water. As the distilled vinegar is not uniform in strength, the precise proportion necessary to be added cannot be assigned, but in general it will be about thirty parts to one. As much must always be added as to produce neutralization; and as the liquid is sometimes used as an external application in cases where the acrimony of the alkali would be hurtful, it is better that there should be even a slight excess of acid. From the variable quantity of acid in the vinegar, the preparation cannot be of uniform strength, and this cannot be obviated by crystallizing the salt, the heat decomposing it which would be necessary to evaporate the water. Were it of any importance, a uniformity of strength might be obtained by ordering the quantity prepared from a given weight of carbonate of ammonia to be reduced by slow evaporation to a certain measure; but this is not necessary, the solution having no great activity, and being given generally in divided doses. It is employed as a diaphoretic in febrile affections, an ounce of it being given, and repeated twice or thrice at intervals of an hour, and its operation promoted by mild diluents. Externally it is used as a discutient, and likewise as an application in some forms of inflammation.

HYDRO-SULPHURETUM AMMONIÆ. Hydro-Sulphuret of Ammonia. (Hydro-Sulphuretum Ammoniæ, *Ph. Dub.*)

" Take of Water of Ammonia, four ounces. Expose it in a chemical apparatus to the stream of gas which arises from Sulphuret of Iron, four ounces; Muriatic Acid, eight ounces, previously diluted with two pounds and a half of Water. The sulphuret of iron for this purpose is conveniently prepared from three parts of Purified Iron Filings, and one part of Sublimed Sulphur, mixed together, and exposed in a covered crucible to a moderate heat, until they unite.

The sulphuretted hydrogen is produced in this process by the muriatic acid enabling the iron to decompose part of the water by attracting its oxygen. The hydrogen disengaged combines with a portion of the sulphur, and forms sulphuretted hydrogen; and this elastic fluid being transmitted through the water of ammonia unites with it, and forms a liquid of a dark green colour, and a very fœtid odour.

The medicinal applications of hydro-sulphuret of ammonia have been already taken notice of. It depresses the action of the stomach and digestive organs, and has been used from this quality in bulimia and in diabetes, in a dose of from five to ten drops twice a day.

Aqua sulphureti ammoniæ. Water of Sulphuret of Ammonia. Ph. Dub.

"Take of recently Prepared Lime, Muriate of Ammonia in powder, each four ounces; of Sublimed Sulphur, Warm Water, each two ounces. On the lime in an earthen vessel, sprinkle the water, and cover the vessel until the lime fall to powder. This, when cold, mix by trituration with the sulphur and muriate of ammonia, avoiding the acrid vapour which arises. Put the mixture into a retort, and distil with a strong heat suddenly raised. Keep the liquor thus obtained in a phial closely stopped with a glass stopper."

This preparation is similar to one long known to chemists by the name of Fuming Liquor of Boyle, and which Berthollet considered as a hydro-sulphuret of ammonia much concentrated, with an excess of ammonia, to which he ascribed its fuming property. As muriatic acid, when added to it, causes not only a disengagement of sulphuretted dydrogen, but likewise a precipitation of sulphur, it is probably rather a sulphuretted hydro-sulphuret. It has not been applied to any medicinal use.

Sulphas aluminæ exsiccatus, *olim Alumen Ustum.* (Alumen Exsiccatum, *Ph. Lond.*—Alumen Ustum, *Ph. Dub.*)

"Let Alum be liquefied in an earthen or iron vessel, and exposed to heat, until it cease to boil."

In this process, the alum loses merely its water of crystallization; it is deprived of its hardness, and resolved into a spongy mass, easily reducible to a fine powder; and both from this, and from being rendered more active, it is better adapted to the purposes of an escharotic, to which it is applied.

LIQUOR ALUMINIS COMPOSITUS. Compound Solution of Alum. Ph. Lond.

"Take of Alum, Sulphate of Zinc, each, half an ounce; Boiling Water, two pints. Dissolve the alum and the sulphate of zinc in water; then strain through paper."

This forms a strong astringent solution which has been employed to check hæmorrhage or profuse mucous discharges; and when considerably diluted has been used as a collyrium.

MURIAS BARYTÆ. Muriate of Barytes.

Take of Carbonate of Barytes, Muriatic Acid, each, one part; Water, three parts. To the water and acid mixed together, add the carbonate, bruised into small pieces. The effervescence being finished, digest for an hour, then strain, and after due evaporation put the liquor aside that crystals may form. Repeat the evaporation as long as there is any formation of crystals.

"If the carbonate of barytes cannot be procured, the muriate may be prepared from the sulphate, in the following manner:

"Take of Sulphate of Barytes, two pounds; Wood Charcoal in powder, four ounces. Calcine the sulphate, that it may be the more easily reduced to a fine powder, with which is to be mixed the powder of charcoal. Put this into a crucible, and having adapted a cover, urge it with a strong fire for six hours. The matter being well triturated, put it into six pounds of Boiling Water, in a closed glass or earthen vessel, and mix them by agitation, preventing, as much as possible, the access of the air. Let the vessel stand in a vapour bath, until the part

not dissolved has subsided; then pour off the liquor. Pour on the residuum four pounds of boiling water, which after agitation and subsidence, add to the former liquor. While it is yet hot, or, if it has cooled, having again heated it, drop into it Muriatic Acid as long as effervescence is excited. Then strain it and evaporate, that it may crystallize."

The first of these processes is the most easy of execution, the muriatic acid combining with the barytes, and disengaging the carbonic acid with effervescence; the muriate of barytes remaining dissolved, and by evaporation being obtained crystallized. But the native carbonate of barytes being not an abundant mineral production, is not always to be procured: the second process, therefore, is inserted, in which the sulphate, which is a more common fossil, is substituted. In this process, the carbonaceous matter with which it is heated attracts the oxygen of the sulphuric acid; the sulphur remains united with the barytes. This sulphuret of barytes is dissolved by the water, and freed from any undecomposed sulphate; but in dissolving, it is at the same time, like other sulphurets with an alkaline or earthy base, partially changed; a portion of its sulphur attracts oxygen from the water, reproducing sulphuric acid, with which a little barytes unites and is precipitated; the hydrogen of the decomposed water unites with another portion of sulphur, forming sulphuretted hydrogen, which enters into combination with the remaining sulphuret of barytes, and prevents its farther decomposition. When the muriatic acid is dropped in, it combines with the barytes, disengages the sulphuretted hydrogen, and precipitates the sulphur. The solution of muriate of barytes, on evaporation, affords the salt crystallized. This process, though a little complicated, is perhaps preferable to any other, as it must afford the barytic salt free from any metallic impregnation; for, if any metallic matter be mixed with the sulphate, being reduced by the charcoal, it will not be dissolved in any subsequent step of the process.

Solutio muriatis barytæ. Solution of Muriate of Barytes.

"Take of Muriate of Barytes, one part. Distilled Water, three parts. Dissolve."

The muriate of barytes was introduced by Dr. Crawford as a remedy in scrofulous affections, as has been already stated under the class of tonics, to which it belongs. This saturated solution is designed to afford a preparation of uniform strength,—a circumstance of importance, as from the activity of the medicine its dose requires to be regulated with some care. Five drops are given twice a day, and gradually increased to twenty or more.

Carbonas calcis præparatus, *olim Creta Præparata et Cancrorum Lapilli, vulgo Oculi Cancrorum Præparati.* Prepared Carbonate of Lime, formerly Prepared Chalk, and Prepared Crabs Stones, commonly called Crabs Eyes.

"Carbonate of Lime, whether the softer variety, commonly named Chalk, or the harder, called Crabs Stones and Crabs Eyes, after being rubbed to powder in an iron mortar, and levigated with a little water on a porphyry stone, is to be put into a large vessel. Water is to be poured upon it, and after the vessel has been frequently agitated, it is to be poured off, loaded with the fine powder. On the water remaining at rest, a subtile powder subsides, which is to be dried. The coarse powder which the water could not suspend, is to be again levigated, and treated in the same manner." The same directions nearly are given for the preparation of chalk, by the London College; the crabs claws and concretions they have rejected, retaining in place of them, as purer than the chalk, Prepared Shells, the process for obtaining which has been already given (page 10.) The directions given by the Dublin College for the preparation of chalk are also similar; and they have likewise admitted Prepared Oyster Shells, and Prepared Egg Shells, (Ovorum Testæ Præparatæ, Ostrearum Testæ Præparatæ,) these being prepared as chalk.

Chalk is a native carbonate of lime, seldom perfectly

pure, but containing often portions of argillaceous and siliceous earths. The crabs stones are concretions found in the stomach of the river craw-fish, (Cancer Asticus). They are collected when the animal is in a putrid state, are washed and dried. They have the advantage of being free from any gritty particles, and form therefore a smoother powder. They consist of carbonate and phosphate of lime, with a portion of gelatin; the proportion of carbonate being about seventy, of phosphate ten or twelve. The shells are of similar composition; but for all these there is generally substituted in the shops merely chalk prepared with more care, and having a little gelatin diffused through it. They are used as antacids.

Potio carbonatis calcis, *olim Potio Cretacea.* Potion of Carbonate of Lime.

"Take of Prepared Carbonate of Lime, an ounce; Refined Sugar, half an ounce; Mucilage of Gum Arabic, two ounces. Rub them together, and then add gradually, Water, two pounds and a half; Spirit of Cinnamon, two ounces. Mix them."

This is similar to the chalk mixture of the other Pharmacopœias, already noticed, and is merely a convenient form for exhibiting carbonate of lime.

Creta præcipitata. Precipitated Chalk. Ph. Dub.

"Take of solution of Muriate of lime, any quantity. Add to it, of Carbonate of Soda, dissolved in four times its weight of warm distilled water, as much as may be sufficient to precipitate the chalk. Render the precipitate pure, by allowing it to subside three times, and washing it each time with a sufficient quantity of water. Then collect it, and dry it on a chalk stone or bibulous paper."

In this process, the muriate of lime is decomposed by double affinity, the muriatic acid being attracted by the soda, and the carbonic acid combining with the lime. It affords a pure carbonate of lime, but is scarcely of

sufficient importance to be received as an officinal preparation.

CALX. Lime. Ph. Lond.

"Take of Limestone, a pound. Bruise it into small pieces and calcine these in a crucible with a very strong fire for an hour, or until the carbonic acid is entirely expelled, so that acetic acid, when added, shall not disengage any bubbles of air. In the same manner, lime may be prepared from shells, after these have been washed in hot water, and freed from their impurities."

There is little advantage in the introduction of this process; lime prepared on the large scale, for the numerous uses to which it is applied, being sufficiently pure for any medicinal purpose, especially as, when it is internally administered, it must always be given in solution; and in the state in which it is usually met with, it impregnates water just as strongly as lime in its purest state.

AQUA CALCIS. Lime Water. (Liquor Calcis, *Ph. Lond.*—Aqua Calcis, *Ph. Dub.*)

"Take of lime recently prepared, half a pound; Put it into an earthen vessel, and sprinkle upon it, four ounces of water, keeping the vessel closed while the lime becomes hot, and falls into powder; then pour on it twelve pounds of water, and mix them by agitation. After the lime has subsided, repeat the agitation; and do so about ten times, keeping the vessel always shut, that the free access of the air may be prevented. Let the water be strained through paper, interposing between the filter and the funnel glass rods, that the water may pass through as quickly as possible. Let it be kept in bottles well stopt."

Lime is sparingly soluble in water; not more than $\frac{1}{600}$ being dissolved, at 60°. Yet, notwithstanding this small quantity, the water has a strong styptic taste, and changes the vegetable colours to a green. The caution to exclude the air in this process, arises from the sup-

position that the lime would combine rapidly with the carbonic acid of the atmosphere. After the solution is strained, it is at least necessary that it should be kept in vessels well stopt. Lime water is the form under which lime is always used internally. It is employed as a tonic, astringent, and antacid in dyspepsia, chronic diarrhœa, and leucorrhœa. Its dose is from one to two pounds daily.

Aqua calcis composita. Compound Lime Water. *Ph. Dub.*

"Take of Guaiac Wood in shavings, half a pound; Liquorice Root cut and bruised, an ounce: Bark of Sassafras bruised, half an ounce; Coriander Seeds, three drachms; Lime Water, six pints. Macerate them without heat for two days, and strain."

The lime water can derive very little additional power from these ingredients, and they, on the other hand, must have their powers very imperfectly extracted. The preparation is one, therefore, which can have little activity.

Solutio muriatis calcis. Solution of Muriate of Lime. (Aqua Muriatis Calcis, *Ph. Dub.*)

"Take of Pure Carbonate of Lime (namely, White Marble,) in small pieces, nine ounces; Muriatic Acid, sixteen ounces; Water eight ounces. Mix the acid with the water, and add gradually the pieces of carbonate of lime. The effervescence being finished, digest for an hour. Pour off the liquor, and reduce it by evaporation to dryness. Dissolve the residuum in its weight and a half of water, and strain."

The muriatic acid combines with the lime, and disengages the carbonic acid. To remove any superfluous acid, and obtain a solution of uniform strength, the solid salt is obtained by evaporation, and is then dissolved in a fixed proportion of water. The solution of muriate of lime has been recommended as a tonic, similar, and not inferior to the muriate of barytes. The dose is from fifteen to twenty grains of the dried salt, or thirty drops of the solution.

CARBONAS MAGNESIÆ, *olim Magnesia Alba.* Carbonate of Magnesia.

"Take of Sulphate of Magnesia, Carbonate of Potash, of each equal weights. Let them be dissolved separately in twice their weight of warm water, and either strained or otherwise freed from impurities. Then mix them, and immediately add eight times their weight of boiling water. Boil the liquor for a short time, stirring it, then allow it to remain at rest, until the heat be diminished a little, and strain it through linen, on which the carbonate of magnesia will remain. Wash it with pure water, until it be perfectly tasteless."

In this process there is a mutual decomposition of the salts, the sulphuric acid of the sulphate of magnesia combining with the potash of the carbonate of potash, and the carbonic acid uniting with the magnesia. The use of adding the boiling water, and boiling the liquor, is, partly to dissolve the sulphate of potash, which is a salt sparingly soluble, and partly to prevent a species of crystallization which the carbonate of magnesia would undergo, rendering it gritty, and thus give it a smoothness which it has not when this precaution is not observed. Carbonate of magnesia, however, is generally prepared on a large scale from the Bittern, or liquor remaining after the crystallization of muriate of soda from sea-water, which is principally a solution of muriate of magnesia. This is decomposed by carbonate of potash, or sometimes by an ammoniacal carbonate, and there are some niceties of manipulation requisite to give it the whiteness, lightness, and smoothness, which are valued as marks of its goodness. Hence it is superior in these qualities to what it would be were it prepared by the above process on a small scale.

Carbonate of magnesia, properly prepared, is nearly insipid; it is extremely light, white, and smooth to the touch; is insoluble in water. It consists of from 45 to 55 of magnesia, from 25 to 48 of carbonic acid, and from 15 to 30 of water. What appears to be the neutral carbonate, obtained in crystals by mixing the saline so-

lutions without applying heat, consists of 25 of magnesia, 50 of acid, and 25 of water. The common preparation is therefore a sub-carbonate. It is given as an antacid in a dose from a scruple to a drachm, and usually produces at the same time a laxative effect.

MAGNESIA, *olim Magnesia Usta.* Magnesia.

"Let Carbonate of Magnesia be exposed in a crucible to a red heat, for two hours. Then preserve it in glass phials well stopt."

By the heat thus applied, the carbonic acid of the carbonate, and a considerable portion of its water, are expelled, and the pure magnesia remains. It loses about half its weight. A smaller quantity, therefore, of the pure magnesia, will produce the same effect as a larger of the carbonate. It is preferred to the latter, both from this circumstance, and also, where, from the abundant acidity on the stomach, flatulence is occasioned by the disengagement of carbonic acid when the carbonate is employed.

CHAPTER XX.

METALLICA.—METALLIC PREPARATIONS.

METALS are distinguished by their opacity, brilliancy, and density. They are fusible and volatile at very different degrees of heat; and at various temperatures they combine with oxygen, forming oxides, and, in two or three cases, compounds possessed of acid properties.

The metals used in medicine are, Silver, Quicksilver, Copper, Iron, Lead, Tin, Zinc, Bismuth, Antimony, and Arsenic.

Metals in their pure state being insoluble in the animal fluids, can scarcely exert any action on the system. Tin, by a mechanical action, is supposed to have an

anthelmintic power: some of the others, as iron, copper, and lead, have been supposed to be capable of being acted on by the gastric fluids, so as to produce certain effects; but in general they must be combined with other agents to render their action powerful and certain; and it is their preparations only that are used in medicine.

The general changes which metals are made to undergo, to fit them for medicinal purposes, are, combining them with oxygen, and farther, combining the oxides thus formed with acids. In general, it is true, that the metal is more active as a medicine, the more highly it is oxidated, though to this there are some exceptions; and its activity is still farther increased by combination with an acid. In general also, where the metal is combined with an acid, it is more certain in its operation than where it is merely oxidated, as the activity of the oxide may be influenced by the state of the stomach with respect to acidity; and, besides, uniformity of composition is in general more easily attained in the saline compound than in the oxide alone, and its state of aggregation has usually, from its solubility, less influence on its action.

The metallic preparations form some of our most important remedies. They are those most liable to uncertainty in their operation, from variations in the processes to which they are subjected: they are at the same time those which, from their activity, it is necessary to have least variable in strength. The principles, therefore, which regulate their combinations, so far as these are connected with their pharmaceutic preparation, are highly important; and as this subject has not been much illustrated, and errors with regard to it are not unfrequent, I have thought it necessary to consider it at some length, before proceeding to the individual preparations.

The simplest form of combination in which metals are given, is combined with oxygen, or in the state of oxide. In this state they act with more or less power on

the living system. Their oxidation is generally effected by the action of atmospheric air, assisted by heat, sometimes by deflagration with nitre, and sometimes also by acids, the acid being afterwards abstracted by the action of a substance exerting an affinity to it.

The principal objection to this form of preparation is the uncertainty to which it is liable in the uniformity of its composition. Every metal, in exerting an affinity to oxygen, is capable of combining with that principle in different proportions; and its power of acting on the living system in common with all its qualities, is much influenced by the quantity with which it is combined.

Now, the degrees of oxidation of which a metal is susceptible are numerous, and, there is much reason to believe, are even indefinite, from the *minimum* to the *maximum*. The reverse of this opinion has indeed been maintained, and it has been supposed that metals are capable of undergoing only certain fixed degrees of oxidation. But the opposite conclusion appears to be more just. If we take, for example, black oxide of manganese, and expose it to heat, part of its oxygen is expelled; and this is more or less, according to the degree of heat applied: in this decomposition there are no fixed stages in the decomposition, where oxides of a certain uniformity of composition, or with a determinate proportion in oxygen, are obtained; but there is a series perfectly indefinite, from the perfect black oxide to that which approaches nearest to the metallic state. Six oxides of antimony have been described, and there is probably a greater number.

The only case in which oxides of uniform and determinate composition can be expected to be obtained, are where they are formed under circumstances which establish a perfect uniformity in the process. Thus, if a metal be oxidated by the atmospheric air, exactly at the point at which it melts, as that point is uniform, or always the same, the oxide will likewise be uniform; and for the same reason, if an oxide is formed at the vaporific point, it will be always of the same composition.

But where such a uniformity of external circumstances does not exist, the degree of oxidation may be variable, and, there is every reason, both from facts and from the laws of chemical affinity to believe indefinite

This consideration ought to establish a rule in Pharmacy, which has unquestionably been too much neglected The opinion having been adopted, that the metals are susceptible only of few and determinate degrees of oxidation, the conclusion has been too hastily adopted, that even with considerable variations in the process, or by processes extremely dissimilar, the ultimate product will be the same. There is every reason to believe that this is incorrect; and hence, when a process for the preparation of any metallic oxide has once been established, and practitioners have become accustomed to its powers and strength, the process ought not to be varied or changed, from he idea of some trivial improvement; as an alteration of circumstances, apparently of little importance, may give rise to a very important change in the result. And it is nearly demonstrable, that the oxides of a metal formed by different processes, as, for example, by a process conducted in the humid way, or by one with the application of heat, cannot be precisely the same.

The other form of preparation under which metals are administered, is that in which the metallic oxide is combined with an acid. Compounds of this kind are generally more active than those in which the metal is merely oxidated. The acid perhaps imparts an additional activity, and the compound being generally more or less soluble, while the oxides are usually insoluble, the former must, from this cause, act more powerfully on the stomach, and be more readily received into the circulating mass.

These combinations are generally formed by subjecting the metal to the action of the acid. The acid first yields to it oxygen, either directly, by parting with a portion of what it contains, or by a resulting affinity, enabling it to attract oxygen from the water which may

be present, or from the atmospheric air. With the oxide formed in either of these modes, the acid then combines.

As a metal can exist in different degrees of oxidation, so it may enter into combination with acids with different proportions of oxygen, and from this circumstance, very important differences in their medicinal powers are established. What preparations can differ more widely than the corrosive muriate, or corrosive sublimate, as it is named, of mercury, and the mild muriate or calomel? Yet the primary difference between them is in the degree of oxidation of the metal, the proportion of oxygen being less in the latter than in the former.

In general, when a metal is acted on by a weak acid, or one much diluted, it forms a compound, in which it is less oxidated than when it has been subjected to the action of a more powerful or concentrated acid. Or if heat has been employed to favour the mutual action, the metal passes to a higher state of oxidation than when it has been dissolved in the cold.

It even often happens, that after a metal has been oxidated and combined with an acid, it continues to attract oxygen, either from the acid, or from the atmospheric air,—a circumstance requiring to be attended to in Pharmacy, as giving rise to alterations in metallic preparations.

It has been stated, that a metal combines with oxygen in general, not in determinate proportions, but indefinitely. The question naturally occurs, therefore, does this also happen when they combine with acids, or do they enter into such combinations only in certain determinate degrees of oxidation? No question in Pharmacy can be more important: for, according as one or other of these happens, either uniformity of composition, or much uncertainty may be expected to be found in metallic preparations; and if the latter be the case, much more attention will be required, than might be supposed necessary in establishing a strict uniformity in the processes by which these preparations are formed.

In general, it appears, that the acid, by the energy of the affinity it exerts, has a very powerful effect in rendering the degree of oxidation determinate, and that these combinations, are, therefore, usually established with uniform proportions. We have an example of this in the two muriates of mercury. In each of these the metal is in a certain state of oxidation, and whatever process be followed, no intermediate combination appears to be formed. At the same time, it must be admitted, that the degree of oxidizement of the metallic oxide, in combining with the metal, appears also to be sometimes indefinite. Thus, in crystallizing a solution of iron in dilute sulphuric acid, the crystals which are first formed are of a pale green colour; those formed by a second or third evaporation are deeper, and there remains a liquid incapable of crystallizing. In all these there are different states of oxidation. In like manner, in the solution of mercury in nitric acid, the acid may exist in a number of different degrees of oxidation, according to the manner in which the solution has been performed, and these solutions will give rise to very different compounds in the decompositions and new combinations to which they may be subjected.

Another source of uncertainty in the composition of the metallic salts, is, that the metallic oxide can combine with various and apparently indefinite proportions of acid. We can have the compound with the acid and metallic oxide combined in those proportions which give rise to neutralization, but we can have it also with various degrees of excess of acid, or excess of base; and each of these will give a preparation different in power, and liable to be very differently affected by other chemical agents.

This is in particular often displayed in preparing metallic compounds by the medium of acids. From the uncertainty to which the oxidation of metals, by the application of heat, is liable, it has frequently been proposed to obtain the product in the humid way, the metal being dissolved in an acid, and this acid being abstracted after-

wards by a substance exerting an affinity to it, and the metal precipitated in its oxidated state. But in almost every case these precipitates are not pure oxides, as they have been supposed to be; they retain a portion of the acid with which the oxide was combined, and are therefore sub-salts. They are sometimes thrown down merely by water, and they then retain a considerable proportion of acid in combination; and even when subjected to the more powerful action of an alkali, the whole of the acid is not abstracted, the influence of quantity adding so much to the force of affinity, that a portion of it is retained by the oxide.

In these precipitations from the decomposition of metallic salts, the composition of the precipitate is frequently rendered still more complicated, from part of the precipitating substance entering into the combination.

The influence of the proportions in which a metallic oxide and acid may combine, is shown in another case, —that where, by applying heat, the acid may have its solvent power so far aided, and be from this cause so saturated with the oxide, as to be incapable of retaining the whole of it in solution when diluted. When water is added, therefore to a solution of this kind, a partial decomposition ensues; part of the metallic oxide is precipitated, retaining a portion of acid united with it, forming a sub-salt, while the other portion remains dissolved with a slight excess of acid. Now, if such a solution is to be decomposed by adding a neutral salt with the acid of which the metallic oxide is designed to be combined, the mere water in which the salt is dissolved will at the same time act on the metallic solution, and throw down a quantity of this precipitate, which will mingle with the precipitate formed by the metallic oxide and the acid of the decomposing salt, and will of course modify its powers. Hence, a metallic solution is liable to afford, when decomposed, a very different product, both from the different states of oxidation in which it may hold the metal dissolved, and the different proportions of oxide with which the acid may be combined.

Metallic preparations, it is thus obvious, are liable to considerable uncertainty of composition; and this suggests the conclusion, that processes with regard to them, once established, ought not to be hastily altered, even in circumstances which may appear trivial. It is equally obvious how important it is, that for every active metallic preparation, the same process should be adopted in every country.

The nomenclature of the metallic saline preparations is attended with considerable difficulty, especially in discriminating between the different salts formed from the same acid, united with the same metal, but existing in different states of oxidation. This difference gives rise to very different medicinal properties, or at least very different degrees of activity, and renders it necessary, therefore, that the names ought to be so far distinct, that the one salt cannot be mistaken for the other. Now, the chemical nomenclature is, with regard to this case, defective, and it is difficult to render it more precise. The system of nomenclature requires that the name of each compound salt should be derived from the acid and the base of which it is composed, the acid affording the radical of the generic name, the base giving the specific appellation. But the names of the species of metallic salts have been derived, not from the metallic oxide which is strictly their base or the substance in direct combination with the acid, but from the metal itself. We thus speak of sulphate of iron, muriate of mercury, and others, when the salt is actually sulphate of oxide of iron, muriate of oxide of mercury, &c. Did the metal exist always in one state of oxidation as it is combined with the acid, this nomenclature would give rise to no inconvenience. But as it is often in different states of oxidation, the nomenclature is deficient, or something more is required to distinguish between the different salts which, from these different states of oxidation, may be formed from the same metal and the same acid.

In the cases which have been hitherto observed, in general, not more than two salts are formed from di-

versity of oxidation in the same metal combined with the same acid; and one method which has been employed to mark their distinction, is to apply the usual generic name to the salt formed from the metal in the low state of oxidation, and to prefix to the same generic name applied to the other salt, the syllable *oxy*, as denoting the higher degree of oxidation. Thus we have two muriates of mercury, one containing the metal at a low, the other at a high degree of oxidation, and these, according to this method, would be distinguished, the one by the name of Muriate, the other by that of Oxymuriate of Mercury. But, independent of the objection, that this violates the principles on which the nomenclature is constructed, since the one salt is just as much a muriate as the other; the syllable *oxy* is appropriated, in the language of Modern Chemistry, to a different purpose, that of denoting the compounds of an oxygenated acid; and Oxymuriate of Mercury, a name now sanctioned by the London College, expresses therefore, not a compound of muriatic acid, as the salt actually is, to which it has been improperly applied, but a compound of oxymuriatic acid, which it is not. Besides, as a medical nomenclature, the merely prefixing the syllable *oxy* to the same term is far from being sufficient to distinguish between salts totally different, and which it is in the highest degree dangerous to confound. Another method likewise employed, is to apply the generic term to the salt formed from the oxide at the maximum of oxidation, and to prefix to the same term applied to the salt at the minimum, the syllable *sub*; naming, for example, one of the salts of mercury now referred to, Muriate of Mercury, the other Sub-Muriate of Mercury. This has been adopted by the Edinburgh College; but it is equally incorrect. The principles on which the modern nomenclature is founded, require that the epithet *sub* should be appropriated to the names of those salts in which there is a deficiency of acid or excess of base; the base, however, still being the same as that of the corresponding salt, to the name of which this epithet

is not prefixed. But in the metallic salts to which this mode has been applied, there is no deficiency of acid, and the base is not the same; the salt to which the epithet *sub* is applied may contain less acid than the other, but this is because the oxide, which is its base, requires less for its saturation; it is altogether a different species, and by the addition of acid, it cannot be converted into the other, which it would be, were it, as the name implies, a Sub-salt. This mode too is liable to the same objection as the other, the merely prefixing to the name common to both, the epithet *sub*, to distinguish one of them, not being sufficiently distinctive, where it is of so much importance that they should be distinguished. These two methods also are unfortunately opposed to each other, the usual generic name being applied according to the one mode to the one salt, while, according to the other, it is applied to the other; thus the term Muriate of Mercury, will, in the one, be employed to denote the salt with the metal in the highest state of oxidation, and in the other, it will be applied to the salt precisely the reverse,—a circumstance which renders the adoption of either method improper.

Any nomenclature founded on the supposition of specific degrees of oxidation being established, would be equally improper; for, even supposing them not to be indefinite, which, however, there is every reason to believe they are, the propriety of the appellation in any case would depend on the perfect accuracy of the analysis, and the discovery of a different degree of oxidation with regard to any metal would require the change of the nomenclature of its salts, and, what is still worse, would cause a name, which had been appropriated to one, to be transferred to another.

The only mode that appears practicable, is to derive the distinctive appellations of these salts from properties in which they differ. If two salts, formed from the same metal and the same acid, but only in different states of oxidation, differ in colour, as is frequently the case, this affords a ground of discrimination in their names, and

it is accordingly sometimes had recourse to. Thus, we speak of the green and the brown sulphate of iron. If the colour be the same in each, which may be the case, then the distinction may be drawn from any other property in which they differ. Thus the two muriates of mercury may be distinguished, the one by the appellation of Corrosive Muriate, the other by that of Mild Muriate. This nomenclature, while it violates no principle, has the advantage, that being founded on the properties of the substances, it is permanent; and as applied to medicinal substances, it has the not less important advantage, that it serves in the more important cases to point out the difference to which it is most essential to attend. If there should be even cases in which there is no difference of properties sufficiently important to afford a distinctive appellation, it would be better to have recourse to the periphrasis expressing the difference in the state of oxidation to discriminate between them, than to employ a nomenclature, neither sufficiently distinctive nor correct.

Metals are sometimes employed medicinally, combined with sulphur or with sulphuretted hydrogen When the sulphur is united with the metal itself, the preparation is generally inactive. When the metal is oxidated, and farther combined, either with sulphur or sulphuretted hydrogen, it is more active; but as the degree of oxidation may be various, and as the affinities exerted by sulphur or sulphuretted hydrogen are not sufficiently energetic to render them definite, these preparations are liable to be variable in strength. Hence few of them are retained.

ARGENTUM.—SILVER.

Nitras argenti, *olim Causticum Lunare.* Nitrate of Silver. (Argenti Nitras, *Ph. Lond.*)

"Take of the Purest Silver, extended in plates and cut, four ounces; Diluted Nitrous Acid, eight ounces:

Distilled Water, four ounces. Dissolve the silver in a phial with a gentle heat, and evaporate the solution to dryness. The mass being put into a large crucible, let this be placed on the fire, which must be at first gentle, and gradually increased until the matter flow like oil. Then pour it into iron pipes heated and rubbed with grease. Lastly, keep it in a glass vessel well stopt."

The silver in this process is oxidated and dissolved by the nitrous acid. By the subsequent fusion, a considerable part of the acid is expelled, so that the product is rather a sub-nitrate than a nitrate of silver. The metal ought to be pure, as in the state in which it is usually met with in commerce it has an alloy of copper, which gives to the preparation a green colour, and renders it more deliquescent. It is, as has already been stated, a powerful escharotic, and has the advantage of being easily applied, and confined, and of acting quickly. It is therefore the one in general use for the common purposes for which the escharotics are employed.

ANTIMONIUM.—ANTIMONY.

SULPHURETUM ANTIMONII PRÆPARATUM, *olim Antimonium Præparatum.* Prepared Sulphuret of Antimony, formerly Prepared Antimony. (Sulphuretum Antimonii Præparatum, *Ph. Dub.*)

" Let Sulphuret of Antimony be prepared in the same manner as Carbonate of Lime."

This preparation is merely levigation, and when the sulphuret of antimony is levigated, it has been supposed to act with more certainty than when given in a coarser powder. It is still, however, very inactive. As a remedy in chronic rheumatism, it has been given in a dose of five or ten grains daily.

OXIDUM ANTIMONII CUM SULPHURE VITRIFICATUM, *olim Vitrum Antimonii.* Vitrified Sulphuretted Oxide of Antimony.

" Strew Sulphuret of Antimony, rubbed to a coarse powder like sand, on a shallow unglazed earthen vessel,

and apply to it a gentle fire, that the sulphuret of antimony may be slowly heated; at the same time stirring constantly the powder, that it may not run into lumps. White vapours, smelling of sulphur, will arise from it. When these, while the same degree of heat is kept up, cease, increase the heat a little, that vapours may again exhale; and proceed in this manner, until the powder, raised at length to a red heat, exhales no more vapours. This powder being put into a crucible, is to be melted with a strong fire, until it assume the appearance of fused glass; then pour it upon a heated brass plate." When solid, it has completely the vitreous appearance, is transparent in thin plates, and of a reddish brown colour.

In the first stage of this process, the greater part of the sulphur of the sulphuret of antimony is dissipated, and the antimony is imperfectly oxidated. In the second, the heat applied being more intense, the sulphur is more completely expelled, the antimony is more highly oxidated, and the oxide is vitrified. According to Thenard's analysis, this oxide contains 16 of oxygen in 100 parts. Proust has farther shown, that it retains a portion of sulphur combined with it, or, as he states it, a portion of the metallic sulphuret, (about one part in nine of the preparation), and lastly, Vauquelin found, that it always contains siliceous earth, which is discoverable by the gelatinous residuum obtained on evaporation of any saline compound formed from this oxide. The quantity appears to be about 9 or 10 parts in 100; it is derived from the earthy matter of the crucible, and probably promotes the vitrification of the oxide. This preparation is extremely harsh, and at the same time uncertain in its operation, and is hence not used but in preparing some of the other antimonials.

Oxidum antimonii vitrificatum cum cera, *olim Vitrum Antimonii Ceratum.* Vitrified Oxide of Antimony with Wax.

"Take of Yellow Wax, one part; Vitrified Oxide of Antimony with sulphur, eight parts. To the wax, melted in an iron vessel, add the oxide rubbed to powder.

and roast them with a gentle fire, for a quarter of an hour, stirring constantly with a spatula; then pour out the matter. which, when it is cold, rub to powder."

It is probable, that during this process, the oxide of antimony loses part of its oxygen, from the carbonaceous matter of the wax attracting it, as it diminishes in weight; and it is probable also, that its state of vitrification is changed. It becomes much milder in operation. Though once highly recommended in dysentery, it may be regarded as an obsolete remedy. The dose in which it was given, was from five to fifteen grains, and its principal operation was that of a cathartic, from which probably any benefit received from it was derived.

Oxidum antimonii cum phosphate calcis, *olim Pulvis Antimonialis.* Oxide of Antimony with Phosphate of Lime. (Pulvis Antimonialis, *Ph. Lond. Dub.*)

"Take of Sulphuret of Antimony, rubbed to a coarse powder, Hartshorn Shavings, of each equal parts. Mix and throw them into a wide iron pot, red hot, and stir them constantly until they are burnt into a matter of a gray colour, which remove from the fire, rub to powder, and put into a coated crucible. Lute to this crucible another inverted, in the bottom of which a small hole is drilled; apply the fire, which is to be gradually raised to a white heat, and kept at this increased heat for two hours. Lastly, triturate the matter, when cold, into a very fine powder." The process given in the Dublin Pharmacopœia is the same, except that the hartshorn is ordered to be previously boiled to extract from it the gelatin,—a circumstance of little importance, as this gelatin is decomposed by the heat. The London College have unfortunately changed the strength of the preparation, two parts of shavings of horn being employed to one of sulphuret of antimony. The reasons assigned for this are, that the preparation is brought nearer to the strength of *James's* powder, for which this is designed as a substitute, and that it is rendered more manageable in its administration. With regard to the first, it appears to be

founded on a mistake, as with the enlarged proportion of antimony, a preparation different in the proportions of its constituent parts from those of the James's powder, as analyzed by Pearson, must be obtained. And though it were just, it was of more importance to preserve an active preparation, now officinal, of the same strength in all the Pharmacopœias, than to assimilate it to the strength of an empirical remedy. With regard to the other, the powder appears to be just as manageable of the one strength as of the other.

This process has been introduced into the Pharmacopœias, as affording a preparation similar to the celebrated empirical remedy, *James's Powder*. Nothing more was known with regard to this, than that it was an antimonial, until its analysis was undertaken by Dr. Pearson. He found the genuine powder of James to consist of 43 parts of phosphate of lime, and 57 of an oxide of antimony, part of which was vitrified; and by the above formula, he was able to prepare a powder similar to it in qualities and chemical composition. The theory of the process is sufficiently obvious. During the first stage, the animal matter of the bones is decomposed and burnt out; the sulphur of the sulphuret of antimony is expelled, and the metal is imperfectly oxidated. In the second stage of the process, the metal is more completely oxidated, the oxide is partially vitrified, and is perhaps brought into combination with the phosphate of lime, which is the residuum of the bones. This latter supposition remains, however, uncertain. That portion at least of the oxide which is vitrified cannot be combined with the phosphate; the other perhaps may be in this state of combination, as Dr. Pearson supposed, though Chenevix, from his experiments on the powder, supposed them rather to be merely intimately mixed. He found too, that in the preparation obtained by Pearson's process, more of the oxide of antimony is vitrified than in the genuine James's powder, the proportion in the one being not less than 44 in 100 of the oxide, in the other only 28.

Mr. Chenevix has likewise proposed a method of obtaining this preparation in the humid way. It consists in taking equal weights of the white powder precipitated by water, from muriate of antimony, and of pure phosphate of lime, obtained by dissolving calcined bone in muriatic acid, and precipitating the phosphate by ammonia; dissolving these in as much muriatic acid as may be necessary, with the assistance of a moderate heat, and pouring this solution into ammonia diluted with distilled water. The ammonia combines with the muriatic acid, and the oxide of antimony and phosphate of lime are thrown down intimately mixed. This preparation may be more uniform in composition than that obtained by heat, as, in the latter, variations are liable to be introduced from the different degrees of oxidation of which antimony is susceptible, from the vitrification, and from the volatility of the antimonial oxide; but it cannot be the same compound as the other: it is indeed merely a mixture of sub-muriate of antimony and phosphate of lime. It has appeared, from some trials made of it, to be milder in its operation than the other preparation; but it would require much more extensive experience, to determine if it has the same medicinal effects.

The medical history of these preparations has been already delivered. James's powder has been celebrated as a remedy in febrile affections. It acts as a general evacuant, occasioning sweat, purging, and frequently vomiting; and, by this general action, appears sometimes to arrest the progress of fever, if given at its commencement, or to produce a more favourable crisis. Its dose is five or six grains, repeated every six hours, till its effects are obtained. It has been affirmed, that the preparation obtained by the process of the Pharmacopœias is not so certain nor so powerful in its operation as the powder of James, eight grains of the former being not more than equal to six of the latter. The difference, if it exist, may be owing to some peculiarity in the process, by which a difference of oxygenation, or of vitrification of the oxide may be occasioned; and, as has been

already stated, it does appear that the proportion of oxide vitrified is not the same in the one as in the other. It remains to be determined, how far the preparation from the proportions, as given now by the London College, differs from the others.

SULPHURETUM ANTIMONII PRÆCIPITATUM. Precipitated Sulphuret of Antimony. (Antimonii Sulphuretum Præcipitatum, *Ph. Lond.* Sulphur Antimoniatum Fuscum, *Ph. Dub.*)

"Take of Water of Potash, four pounds; Water, three pounds; Prepared Sulphuret of Antimony, two pounds. Boil them in a covered iron pot, on a gentle fire, for three hours, stirring frequently with an iron spatula, and adding water as it may be necessary. Strain the hot liquor through a double linen cloth, and to this strained liquor add as much diluted sulphuric acid as may be necessary to precipitate the sulphuret, which is to be carefully washed with warm water." The process as given by the London College is the same. In the Dublin Pharmacopœia, it differs a little, sub-carbonate of potash and sulphuret of antimony being melted together in a crucible, and the mass, when cold, being boiled with water; the liquor when clear being poured off, and the precipitate thrown down by diluted sulphuric acid. The product, however, will be the same.

From the analysis of this compound by Thenard, it appears to be composed of 68.3 of the orange-coloured oxide of antimony, (which consists of 18 of oxygen, and 82 of antimony,) 17.8 of sulphuretted hydrogen, and 11 or 12 of sulphur. The theory of its formation is somewhat intricate. In boiling the sulphuret of antimony with the potash, a sulphuret of potash is formed, and this decomposing part of the water, a sulphuretted hydro-sulphuret of potash is also produced; the antimony appears to be at the same time oxidated, probably by the sulphuretted hydrogen acting as a weak acid. This oxide is retained in solution by the sulphuretted hydro-sulphuret of potash. When sulphuric acid is added, it unites with the potash; a little of the sulphuretted hydro-

gen is disengaged with effervescence, and the antimonial oxide, combined with the remaining sulphuretted hydrogen and with the sulphur, is precipitated. The compound, therefore, is a sulphuretted hydro-sulphuret of oxide of antimony. The name given to it in the Pharmacopœias does not at all express its real nature.

When the liquor obtained by boiling the solution of potash on the sulphuret of antimony is strained, and allowed to cool, it deposites a red-coloured powder, which has been known by the name of *Kermes Mineral*, and has been much used on the continent. From the analysis of it by Thenard, it appears to be a compound of brown oxide of antimony and sulphuretted hydrogen, with a small portion of sulphur; the proportions being 73 of oxide of antimony, 20 of sulphuretted hydrogen, and 4 of sulphur, the last, as Thenard supposes, being accidental. Trommsdorff attributes the difference between these two preparations to the one *essentially* containing sulphur combined with the oxide of antimony and sulphuretted hydrogen; the other not. Thenard ascribes it rather to a difference of oxygenation, the oxide in the *kermes* being less highly oxidated than in the other; but as both can be obtained from the same solution, either as we allow it merely to cool, or as we add sulphuric acid, which cannot change the state of oxidation, this is not probable, while the difference in the proportion of sulphur must, from the nature of the process, necessarily exist; for in the one case, the oxide can be combined only with those portions of sulphur and sulphuretted hydrogen which it can attract, while in the other the sulphur precipitated by the addition of the acid must be also added. The one preparation, the Kermes Mineral, may be distinguished, though not perfectly correctly, by the name of Hydro-Sulphuretum Oxidi Antimonii Rubrum; the other by that of Hydro-Sulphuretum Oxidi Antimonii Luteum. The quantity of both products, from a given weight of sulphuret of antimony, may be considerably increased by adding a portion of sulphur, and increasing the quantity of alkali, the proportion of

sulphur in the native sulphuret not being sufficient to render the whole of the metal soluble, and a quantity, therefore, without this addition, remaining undissolved.

These preparations agree nearly in their medicinal qualities, which are similar to those of the other antimonials. They have been used principally as diaphoretics and sudorifics, but are always uncertain in their operation. The dose of the precipitated sulphuret of antimony, as it is named, is five or six grains.

OXIDUM ANTIMONII CUM SULPHURE PER NITRATEM POTASSÆ, *olim Crocus Antimonii.* Oxide of Antimony with Sulphur, by Nitrate of Potash.

"Take of Sulphuret of Antimony, Nitrate of Potash, of each the same weight. Triturate them separately, and, having mixed them well together, throw them into a crucible red hot. The deflagration being over, separate the reddish matter from the white crust, and rub it to a powder, which is to be frequently washed with warm water, until it remain insipid."

During the deflagration, the nitric acid of the nitrate of potash is decomposed, and its oxygen is attracted, partly by the sulphur, and partly by the antimony. The sulphurous acid, which is the principal product of the oxygenation of the sulphur, is in part dissipated, and in part combined with the potash; and with a little sulphuric acid likewise produced, forms the white crust which is directed to be removed. By the union of another portion of the oxygen with the antimony, a brown or reddish oxide is formed. It appears also that part of the sulphuret of antimony escapes decomposition or oxygenation, and remains combined with the oxide, in the proportion of about two parts to eight; or rather, perhaps, the oxide retains a little sulphur combined with it. The preparation, therefore, is an imperfect oxide of antimony with sulphur or sulphuret of antimony. It is of a brick red colour; what is to be found in the shops is generally of a gray colour, and is usually prepared very improperly, with a diminished proportion of nitre.

As an antimonial, this preparation is so uncertain in its operation, that it is never prescribed; it is used in making some of the other preparations of this metal.

MURIAS ANTIMONII. Muriate of Antimony.

"Take of Oxide of Antimony with Sulphur by Nitrate of Potash, Sulphuric Acid, of each one pound; Dried Muriate of Soda, two pounds. Pour the sulphuric acid into a retort, adding gradually the muriate of soda and the oxide of antimony, previously mixed. Then distil from warm sand. Expose the distilled matter for some days to the air, that it may deliquesce; then pour the liquid part from the impurities."

In this mode of forming muriate of antimony, the muriate of soda is decomposed by the sulphuric acid combining with the soda; the muriatic acid disengaged, unites with the oxide of antimony, and the compound is volatilized. It is at first of a soft consistence, and cannot be dissolved by pouring water upon it, the mass of water acting on it, by its quantity. and decomposing it, separating a sub-muriate. But, when left exposed to the air, it slowly imbibes as much water as is sufficient for its solution without decomposition, and then forms a dense heavy liquid of a brown colour. By the addition of water to this, the same decomposition is produced, and sub-muriate precipitated

This preparation is unfit for internal use; externally it has sometimes been used as a caustic. Decomposed by potash, it affords an oxide which has been used in preparing the tartrate of antimony.

Muriate of Antimony has not directly a place in the London or Dublin Pharmacopœia; but a process is given for preparing it, with the view of obtaining from it another antimonial preparation,—probably a sub-muriate, though denominated an oxide.

Antimonii oxydum. Ph. Lond.—(Oxydum Antimonii Nitro-Muriaticum, *Ph. Dub.*)

"Take of Sulphuret of Antimony in powder, two ounces; Muriatic Acid, eleven fluid ounces; Nitric Acid, one fluid ounce. To the acids mixed together in a glass vessel, add gradually the Antimony, and digest them with a boiling heat for an hour: then strain the liquor, and pour it into a gallon of water, in which two ounces of Sub-Carbonate of Potash have been previously dissolved. Wash the precipitated powder, by pouring water frequently upon it, until no acid remain, then dry it on bibulous paper." This is the process given in the London Pharmacopœia. In the Dublin, only a drachm of nitrous acid is employed, and the liquor obtained by digesting the materials is decomposed, and the precipitate thrown down, by adding to it a gallon of water, without any sub-carbonate of potash.

Muriatic acid acts very feebly on antimony, not being capable of communicating to it oxygen directly, and the affinity to this principle not being sufficiently strong as to be able, even when aided by the resulting affinity of the acid, to decompose water. By the addition of nitric acid, the oxidation and solution are more easily effected, the nitric acid yielding oxygen to the metal, and the oxide combining with the muriatic acid. The sulphur of the sulphuret suffers little change. The strained liquor, therefore, is a muriate of antimony, and this is undoubtedly at once the most simple and most economical method of procuring it. In the subsequent stage of the process, it is decomposed by the addition, according to the one formula, of a weak solution of sub-carbonate of potash; according to the other, by the addition of water. The precipitate thrown down from muriate of antimony by water used to be regarded as an oxide, but it was long ago shown by Rouelle to be a sub-muriate; the water, by its affinity to the acid, abstracting the greater portion of it; but the oxide still, in conformity to the law which usually regulates these de-

compositions, retaining a portion of the acid combined. If the sub-muriate, after being precipitated, is thoroughly washed with water, and then digested with a solution of potash or sub-carbonate of potash, a considerable portion of this acid is abstracted, though probably not the whole of it; for the influence of quantity on the affinity exerted by the oxide to the acid is always becoming more powerful as the abstraction proceeds, and will cause a part of the acid to be retained. In the method of applying the sub-carbonate of potash directed by the London College, though designed probably to abstract the acid more effectually from the oxide, it is of no advantage in this respect, though it may increase a little the quantity of precipitate. By the agency of the water of the solution the muriate is decomposed, and the sub-muriate thrown down, the liquor above retaining the excess of muriatic acid. This excess of acid the alkali will be spent in neutralizing, and will probably be even insufficient for this; it will thus be prevented from acting on the precipitate, so as to abstract any of the acid it contains, at least, unless it were employed in much larger quantity than is ordered by the College. The method of applying with effect the quantity they use, would be to precipitate the muriate with water, remove the acidulous liquor above, wash the precipitate and then submit it to the agency of the sub-carbonate, by digesting them with a small portion of water. A considerable part of the acid might then be abstracted.

This preparation is not designed for internal administration, but merely for the preparation of other antimonials, and especially of the tartrate of antimony and potash.

TARTRIS ANTIMONII, *olim Tartarus Emeticus*, Tartrite of Antimony, formerly Emetic Tartar. (Antimonium Tartarizatum, *Ph. Lond.*—Tartarum Antimoniatum sive Emeticum, *Ph. Dub.*)

"Take of Oxide of Antimony with Sulphur by Nitrate of Potash, three parts; Super-Tartrate of Potash, four parts; Distilled Water, thirty-two parts. Boil them

in a glass vessel for a quarter of an hour. Strain through paper, and put aside the strained liquor that crystals may form." This is the process in the Edinburgh Pharmacopœia. That which has now a place in the London and Dublin Pharmacopœias is different, principally in the antimonial oxide that is employed. It is thus given in the former. "Take of Oxide of Antimony," (the precipitate from the muriate described in the preceding process,) "two ounces; Super-tartrate of Potash in powder, three ounces; Distilled Water, eighteen fluid ounces. To the water boiling in a glass vessel throw in gradually the antimony and super-tartrate of potash mixed together, and boil for half an hour; then strain the liquor through paper, and boil it down with a gentle heat in a glass vessel, so that while it cools slowly, crystals shall form." The process is the same in the Dublin Pharmacopœia, except that only two ounces and a half of super-tartrate of potash are used.

The excess of tartaric acid in the super-tartrate of potash is capable of combining with a number of the metallic oxides, and of forming ternary compounds. With oxide of antimony, when not too highly oxidated, it unites with facility, forming a combination of this kind, which constitutes the present preparation. As the tartaric acid is saturated, partly by potash, and partly by oxide of antimony, it is not a pure tartrate of antimony, but a tartrate of antimony and potash, and the name given to it in all the Pharmacopœias is chemically incorrect, and is so without any necessity or advantage. According to the analysis of it by Thenard, it consists of 38 parts of oxide of antimony, 34 of tartaric acid, 16 of potash, and 8 of water. It is liable, however, to vary considerably in the proportions of its constituent principles according to the process by which it has been prepared.

These processes have been very various, this being the most important of all the antimonials, and having therefore much engaged the attention of chemists. The principal object of their researches has been to obtain

an oxide, not too expensive in its preparation, and which shall combine with facility with the tartaric acid. The oxide precipitated by potash from muriate of antimony was recommended by Bergman, and employed in the process given in the preceding edition of the Edinburgh Pharmacopœia, but was liable to the former objection, being obtained by a process somewhat difficult, and therefore expensive, and hence, though ordered by the College, not being employed by the apothecary. They have, therefore, substituted the brown oxide prepared by deflagration of sulphuret of antimony with nitre. This answers sufficiently well, if it has been properly prepared. As met with in the shops, it is, however, almost always unfit for this purpose; as, from not being prepared with the due proportion of nitrate of potash, it is not sufficiently oxidated. The vitrified oxide is, perhaps, the most unexceptionable: it cannot be in an improper state of preparation; being prepared on a large scale, it is not expensive, and it is capable of sufficiently saturating the tartaric acid. It was accordingly recommended by Dr. Black. The principal objection to it is, that it contains a portion of siliceous earth, which accompanies the oxide of antimony in its combination with the tartaric acid, and, when the liquor is considerably evaporated, gives to it a gelatinous consistence, and prevents the crystallization. This, however, scarcely forms a just objection, for it is always proper in the crystallization of this salt not to carry the evaporation of its solution too far. The process of crystallization itself appears to produce a division in the principles of the combination, the crystals which form first containing more oxide of antimony than those produced by a farther evaporation, and there remaining at length an uncrystallizable liquid, in which there appears to be an excess of potash combined with the acid and a portion of oxide. As the silex, therefore, does not impede the first crystallization, and as any further crystallization ought not to be attempted, its presence can scarcely be regarded as injurious, and the vitrified oxide is still per-

haps the best on the whole that can be employed. The oxide or sub-muriate introduced by the London and Dublin Colleges is essentially the same with that recommended by Bergman, but being obtained by a much easier process, is not liable to the same objection. It appears, too, to be more easily dissolved by the tartaric acid than any other. The principal doubt that can be suggested with regard to it is, whether, being a sub-muriate, the muriatic acid enters into the constitution of the salt that crystallizes, and modifies its powers. It is possible that it may, and it is equally possible that the small quantity of it which is present may remain in combination with the potash in the residual liquor. If the latter be the case, there can be no just objection to its use. Another source of diversity in the strength of this preparation having perhaps a still greater influence than the oxide employed, is the extent to which the solution is evaporated to cause it to crystallize; the farther the evaporation is carried, more of the potash entering into the composition of the crystals, and the crystals obtained by a second crystallization, when this is practised, being from this cause, too, of a different composition from those of the first.

Tartrate of antimony and potash crystallizes in small triedral pyramids, which are efflorescent. Its solubility has been variously stated, and appears to vary according to the quantity of antimonial oxide contained in it, from proper preparation. On an average, it is soluble in fifteen parts of water at 60°. According to Dr. Saunders, one ounce of water at 60° dissolves fifty-two grains of the fully saturated salt; while of that generally met with, it dissolves from thirty-two to thirty-five. This affords even a mode of judging of the strength of this preparation. It is very susceptible of decomposition, suffering it not only from alkalis, earths, acids, and a number of neutral salts, but even from vegetable infusions and decoctions, the vegetable matter attracting apparently part of the oxygen of the oxide,—decompositions the occurrence of which requires to be guarded against in extemporaneous prescription. If kept dissolved in water,

it is also decomposed, from the spontaneous decomposition of the tartaric acid.

This preparation is undoubtedly superior to the other antimonials, in the certainty of its operation, at least as an emetic, and, from its solubibity, is more manageable with regard to dose. Its medicinal applications have been already noticed. It is given as an emetic in a dose of from one to three grains, dissolved in water; and, in smaller doses, as an expectorant and diaphoretic.

Vinum tartritis antimonii, *olim Vinum Antimoniale.* Wine of Tartrite of Antimony.

"Take of Tartrite of Antimony, twenty-four grains; White Wine, one pound. Mix, so that the tartrite of antimony may be dissolved."

Antimonial Wine, as it was named, was formerly prepared by macerating white wine on the vitrified oxide of antimony in powder, the tartaric acid of the wine dissolving a portion of the oxide, so that the wine acquired the powers of an antimonial preparation. It was liable, however, to be variable in strength, from the proportion of acid in the wine not being uniform. The present preparation was therefore substituted for it. It may be doubted, however, whether it is properly officinal. The salt, dissolved in wine, can indeed be preserved longer without decomposition than when dissolved in water; but, even on long keeping, part of the antimonial oxide is deposited. It is given as an emetic in the dose of one ounce; as a diaphoretic, in a much smaller dose.

Liquor antimonii tartarizati, Solution of Tartarized Antimony. Ph. Lond.

"Take of Tartarized Antimony, a scruple; Boiling Distilled Water, four fluid ounces; Wine, six fluid ounces. Dissolve the tartarized antimony in the boiling distilled water; then add the wine."

This preparation is of the same strength as the preceding one belonging to the Edinburgh Pharmacopœia,

two grains of the tartrate of antimony and potash being contained in an ounce. The dilution of the wine renders it a little more economical, but it is not improbable may have the disadvantage of admitting more readily of the spontaneous decomposition of the metallic salt.

CUPRUM.—COPPER.

AMMONIARETUM CUPRI, *Olim Cuprum Ammoniacum.* Ammoniuret of Copper. (Cuprum Ammoniatum, *Ph. Lond. Dub.*)

"Take of Pure Sulphate of Copper, two parts; Carbonate of Ammonia, three parts. Rub them thoroughly in a glass mortar, until all effervescence is finished, and they unite uniformly into a violet-coloured mass, which being wrapt in bibulous paper, is to be dried, first on a chalk stone, and afterwards with a gentle heat. It is to be kept in a glass phial well stopt."

The sulphate of copper is decomposed by the carbonate of ammonia. One portion of ammonia combines with the sulphuric acid; another portion of it unites with the oxide of copper, and the violet-coloured mass which is formed is a mixture of the two resulting compounds; or, perhaps, what is more probable, the sulphuric acid is in combination with the two bases, forming a ternary compound: the water of the two salts rubbed together, renders the new compound, when it is formed, soft or moist; and the carbonic acid is disengaged with effervescence. The preparation is of a dark-blue colour, which it retains when dried. It has been chiefly employed as a remedy in epilepsy. It is given in a dose of at first half a grain twice a-day, which is gradually and slowly increased to two or three grains, and continued for some time; and for internal administration, it has the advantage, over the salts of copper, of being less liable to excite vomiting.

Liquor cupri ammoniati. Solution of Ammoniated Copper. Ph. Lond.

"Take of Ammoniuret of Copper, a drachm; Distilled Water, a pint. Dissolve the ammoniuret of copper in the water, and filtre the solution through paper."

This is a simpler mode of obtaining a preparation which has had a place in the Pharmacopœias, obtained by an indirect mode given in the following formula, which retains its place in the Dublin Pharmacopœia.

Aqua cupri ammoniati. Water of Ammoniated Copper. Ph. Dub.

"Take of Lime Water, eight ounces; Muriate of Ammonia, two scruples. Prepared Verdigris, four grains. Mix them together, and digest for twenty-four hours; then pour off the pure liquor.

In this indirect mode of combining oxide of copper with ammonia, the lime decomposes the muriate of ammonia, by combining with the muriatic acid, and the disengaged ammonia combines with the oxide of copper of the verdigris or sub-acetate of copper, forming a dilute solution of ammoniureted oxide of copper. It has been applied, diluted with an equal part of water, as a mild escharotic, to remove specks from the cornea, and sometimes, in its undiluted state, as a stimulant and escharotic to ulcers.

Solutio sulphatis cupri composita, *olim Aqua Styptica*. Compound Solution of Sulphate of Copper.

"Take of Sulphate of Copper, Sulphate of Alumine, of each three ounces; Water, two pounds; Sulphuric Acid, one ounce and a half. Boil the sulphates in water, that they may be dissolved; then to the liquor strained through paper add the acid."

This is merely a combination of powerful astringents. It has been applied topically to check hæmorrhage, and largely diluted with water, as a wash in purulent ophthalmia.

FERRUM.—IRON.

FERRI LIMATURA PURIFICATA. Purified Filings of Iron.

"A sieve being placed over the filings, let a magnet be applied, that the filings may be drawn through the sieve upwards."

The iron, from the facility with which it is attracted by the magnet, is by this operation obtained nearly pure, the interposition of the sieve in a great measure preventing particles of other metals, or impurities which are generally mixed with the iron-filings got from the workshops, from being entangled in the cluster which adheres to the magnet. The process, though not always attended to in the shops, is a very necessary one, where iron is to be medicinally employed in this form. or where it is to serve for other preparations of this metal.

OXIDUM FERRI NIGRUM PURIFICATUM, *olim Ferri Squamæ Purificatæ.* Purified Black Oxide of Iron, formerly Purified Scales of Iron. (Oxydum Ferri Nigrum, *Ph. Dub.*)

"Let the scales of black oxide of iron, which are found at the anvils of the workmen, be purified by the application of the magnet; for the magnet attracts only the more thin and pure scales, leaving those which are larger and less pure." The Dublin College direct that the purified scales shall be farther reduced to a fine powder by levigation, in the same manner as chalk.

The scales of iron are the small fragments struck off from the metal when it is heated red-hot. Passing through the atmosphere, at this temperature, they are oxidated, but so imperfectly, as to retain their magnetic quality, and therefore to admit of this mode of purification by the magnet. They are used only in making some of the other chalybeate preparations.

CARBONAS FERRI PRÆPARATUS, *olim Rubigo Ferri Præparata.* Prepared Carbonate of Iron, formerly Prepared Rust of Iron. (Ferri Rubigo, *Ph. Dub.*)

"Purified Filings of Iron are to be frequently mois-

tened with water till they fall into rust, which is to be rubbed to a fine powder."

During exposure to air and moisture, iron is oxidated, and this oxide is found to be combined with carbonic acid, absorbed probably from the atmosphere. As a chalybeate it is rather more active than the pure metal, and more mild than the other saline combinations of iron. Its dose is from 10 to 20 grains. In a large dose it is liable to occasion uneasiness at the stomach.

CARBONAS FERRI PRÆCIPITATUS. Precipitated Carbonate of Iron. (Ferri Carbonas, *Ph. Lond. Dub.*)

"Take of Sulphate of Iron, four ounces; Carbonate of Soda, five ounces; Water, ten pounds. Dissolve the sulphate of iron in the water, then add the carbonate of soda, previously dissolved in as much water as may be necessary, and mix them well together. Let the carbonate of iron, which is precipitated, be washed with water, and afterwards dried."

On mixing the solutions of carbonate of soda and sulphate of iron, the soda attracts the sulphuric acid; the carbonic acid combines with the oxide of iron; the sulphate of soda remains in solution; the carbonate of iron is precipitated. It is to be remarked, however, with regard to this, and all the saline combinations of iron, that the metal enters into them in different states of oxidation, and thus produces very different salts. There is one oxide, the black, nearly at the *minimum*, containing, according to Lavoisier's estimate, 27 of oxygen in 100, which forms one order of salts; there is another, the red oxide, at the maximum, which, according to Proust, contains 0.48, which is the base of another series of saline compounds, and between these, are probably also intermediate combinations. In the present process, the sulphate of iron which is employed containing the metal in the low state of oxidation, it is this oxide which combines with the carbonic acid; but the compound attracts very rapidly oxygen from the atmospheric air, so as to pass to a higher state of oxidation, and the precipitate

of carbonate of iron, in washing and drying, changes its colour, from this cause, from a dark green to a reddish brown. It differs ultimately therefore, in little from the rust of iron, except that it may be somewhat purer.

Carbonate of iron, containing the metal at a low state of oxidation, is a mild and not inactive preparation, preferable to the carbonate or rust, in which the iron is in a higher state of oxidation, as sitting easier on the stomach. The formula of Griffith, which has been highly celebrated as a chalybeate, it has already been remarked, is a preparation of this kind; and as introduced into the London Pharmacopœia, under the name of Mistura Ferri Composita, has been already considered, (p. 25.) It is an extemporaneous preparation (in which only it is obtained at the low state of oxidation) that it ought to be used; and it has probably little advantage over the common rust of iron in the state in which it is obtained by the present process.

Sulphas ferri, *olim Vitriolum Viride.* Sulphate of Iron. (Ferri Sulphas, *Ph. Lond Dub.*)

"Take of Purified Filings of Iron, six ounces; Sulphuric Acid, eight ounces; Water, two pounds and a half. Mix them; and the effervescence being over, digest for a short time in a sand-bath; then strain the liquor through paper, and, after due evaporation, put it aside that crystals may form."

Iron decomposes water very slowly at a low temperature, but when aided by the action of sulphuric acid the decomposition goes on rapidly. The effect in this case may be ascribed to the concurrent affinities of the iron to oxygen, of the acid or rather the base of the acid to oxygen, and of the acid to iron. These co-operating prevail over the single affinity of the oxygen to the hydrogen of the water: the water therefore is decomposed; its oxygen, the iron, and the acid unite, and the hydrogen is disengaged in the elastic form. The iron in this combination is at a low state of oxidation, the *minimum* nearly; and the salt which it forms is the Green Sulphate

of Iron, so named, to distinguish it from the Red Sulphate, in which the metal is more highly oxidated. This green sulphate is prepared for the various purposes to which it is applied in the arts, on a large scale, by exposing the native sulphuret of iron to air and moisture; but, by the present process, it is obtained in a purer state, and fitter therefore for medicinal use. Its crystals are of a light green colour; the residual liquor, by a second evaporation, affords crystals of a darker green, in which the metal appears to exist more highly oxidated. In the shops there is often substituted for this salt the common green vitriol, purified by a second crystallization, a little acid having been added to the solution, to dissolve any excess of oxide.

Sulphate of iron is one of the most active preparations of the metal. Its medium dose is from three to five grains.

Sulphas ferri exsiccatus. Dried Sulphate of Iron (Sulphas Ferri Exsiccatum, *Ph. Dub.*)

"Take of Sulphate of Iron, any quantity. Heat it in an unglazed earthen vessel, on a gentle fire, until it becomes white and perfectly dry."

This is merely the sulphate of iron freed from its water of crystallization by the application of heat. It is not medicinally employed, but has a place in the Pharmacopœia from being used in one or two pharmaceutical preparations.

Oxidum ferri rubrum. Red Oxide of Iron. (Oxidum Ferri Rubrum, *Ph. Dub.*)

"Let dried Sulphate of Iron be exposed to a violent heat, until it is converted into a red coloured matter."

By an intense heat, sulphate of iron is decomposed; its acid is partly expelled, and in part suffers decomposition, being evolved in the state of sulphurous acid; the metal at the same time becomes more highly oxidated. The red oxide is the residuum. To free it more completely from any adhering acid, the Dublin College

order it to be washed with water. It is scarcely medicinally employed, but is used in some pharmaceutical preparations.

TINCTURA MURIATIS FERRI. Tincture of Muriate of Iron. (Tinct. Muriatis Ferri, *Ph Lond. Dub.*)

"Take of the Purified Black Oxide of Iron, in powder three ounces; Muriatic Acid about ten ounces, or as much as may be sufficient to dissolve the powder. Digest with a gentle heat, and, when the powder is dissolved, add as much alcohol as that there shall be of the whole liquor two pounds and a half." The process, as given by the London and Dublin Colleges, differs in the rust or carbonate of Iron being employed, and in the proportions being somewhat different. The following is the formula in the London Pharmacopœia: "Take of Carbonate of Iron, half a pound; Muriatic Acid, a pint; Rectified Spirit, three pints. On the carbonate of iron, in a glass vessel, pour the muriatic acid, and agitate them occasionally for the space of three days. Put the liquor aside, that the impurities may subside, and having poured it off, add the spirit." In the Dublin Pharmacopœia, three pounds of muriatic acid are poured on half a pound of rust of iron; after digestion, the liquor is reduced by evaporation to a pound, and three pints of rectified spirit are added to it. It must therefore be stronger than the other.

Iron, in combining with acids, it has already been remarked, unites with them in different degrees of oxidation; and when at the two extremes, or the *minimum* and *maximum*, forms with the same acid very different salts. This is well displayed in its combination with muriatic acid. When metallic iron is dissolved in the acid, the solution is of a pale green colour, and affords crystals of a similar colour on evaporation. This salt is soluble in water, but is insoluble in alcohol. When the red oxide or the carbonate is dissolved in the acid, the solution is of a yellow colour; it is not crystallizable, but by evaporation is reduced to a deliquescent mass; it is soluble

in water, and is abundantly soluble in alcohol. Of course, it must be this salt which forms the basis of the tincture formed by the present process. In the process, as performed according to the formula of the Edinburgh Pharmacopœia, the black oxide which is employed combines with the muriatic acid, and during the solution acquires more oxygen, principally from a partial decomposition of the water, which is promoted by the heat applied. The muriate of iron, in which this more perfect oxide is contained, is soluble in the alcohol, diluted as it is by the water of the acid ; yet even with this, the metal is scarcely sufficiently oxidated to form the salt, which is entirely soluble in alcohol. The tincture formed is of a pale green colour, ; and it even sometimes happens, that on adding the alcohol to the solution of iron, a great part of the salt is precipitated in crystalline grains. But in a short time, from exposure to the air, oxygen is absorbed, the colour deepens to a yellow, and the precipitate is dissolved. In the process given in the other Pharmacopœias, the metal is submitted to the action of the acid in a higher state of oxidation ; and the compound is at once formed, which is soluble in alcohol. It may therefore be supposed to be preferable, as there is some risk of the other not being properly prepared, from the tincture being perhaps poured off from the precipitate, instead of being allowed to remain over it until it is dissolved. It appears, however, that the metal may be too highly oxidated to remain in combination with the acid, this tincture always depositing a sediment of oxide when long kept, and this is more liable to happen when the metal is even at first in a highly oxidated state.

This tincture is a very grateful preparation ; the alcohol appears to suffer some chemical change from the action of the acid and the metallic oxide, the odour becoming etherial. It is a preparation also highly active. It is given in the diseases in which iron is employed, in a dose from ten to twenty drops, largely diluted with water, or, what is more grateful, in wine. If it produce irritation at the stomach, as it is liable to do from its activity, the dose must be diminished.

The Dublin College have inserted another tincture of muriate of iron, under the name of TINCTURA MURIATIS FERRI cum OXIDO RUBRO. It differs in little from the other tincture which they have admitted, in which the rust or carbonate is dissolved by the acid, but in being prepared from the red oxide, and must be regarded as altogether superfluous.

MURIAS AMMONIÆ ET FERRI, *olim Flores Martiales.* Muriate of Ammonia and Iron. (Ferrum Ammoniatum, *Ph. Lond.*—Murias Ammoniæ et Ferri, *Ph. Dub.*)

"Take of Red Oxide of Iron, washed and again dried, Muriate of Ammonia, of each equal weights. Mix them well together, and sublime." The London College order Carbonate of Iron.

Oxide of iron decomposes muriate of ammonia, by attracting the muriatic acid, and in the present process, this decomposition takes place, ammoniacal gas being exhaled. But from the proportions of the substances employed, part of the muriate of ammonia escapes decomposition, is sublimed by the heat applied, and elevates with it part of the muriate of iron that had been formed; or rather, perhaps, the oxide of iron enters into combination with the acid and part of the ammonia, forming a triple compound. Whichever of these is the result, the process is an unscientific mode of obtaining a muriate of iron: the preparation, too, has been found uncertain in strength, more of the muriate of iron being sublimed, according as the heat is applied strongly and quickly; and, accordingly, it has now fallen into disuse. It was principally employed as a remedy in rickets, in the dose, to children, of two or three grains. It is in crystalline grains, of a yellow colour, and somewhat deliquescent.

TINCTURA FERRI AMMONIATI. Pharm. Lond.

"Take of Ammoniated Iron, four ounces; Proof-Spirit, one pint. Digest and strain."

This solution of the preceding compound is an unnecessary preparation, as it differs little from the tincture of muriate of iron, and must be less certain with regard to strength.

Ferrum tartarisatum. Tartarised Iron. Ph. Lond.

"Take of Iron, one pound; Super-Tartrate of Potash, in powder, two pounds; Distilled Water, one pint. Rub them together, and expose the mixture to the air in an open glass vessel for eight days; then dry it by a sand-bath, and rub it into a very fine powder. To this, having again added a pint of water, put it aside for eight days, then dry it, and rub it into a powder."

By exposure to air and moisture, the iron is oxidated, and its oxide combines with the excess of acid in the super-tartrate of potash, a triple salt resulting, composed of potash, oxide of iron, and tartaric acid. By repeating the trituration and exposure to the air in a humid state, the oxidation of the iron is rendered more complete. The Dublin College give the following formula, by which the saline combination is rendered still more perfect:

Tartarum ferri. Tartar of Iron. Ph. Dub.

"Take of Carbonate of Iron, half an ounce; Crystals of Tartar in fine powder, one ounce; Distilled Water, a pint. Boil them together in a glass vessel, over a slow fire, for an hour, and filtrate the liquor through paper. After it has cooled, and has been filtrated a second time, evaporate it until a pellicle appear on its surface. The liquor, as it cools, will form a saline mass, which is to be reduced to powder, and kept in close vessels."

This is the proper tartrate of iron and potash, as much of the oxide of iron of the carbonate, as the free tartaric acid of the super-tartrate of potash requires for saturation, being dissolved, and the ternary compound being obtained by evaporation. Both this, and the less perfect analogous compound obtained by the preceding process, have been introduced as mild, and, at the same time,

active preparations of the metal. It is easily soluble in water, and may therefore be given in a state of solution, and considerably diluted, a form in which the saline preparations of iron always prove less irritating. The dose is from five to fifteen grains. The preparation obtained by the formula of the Dublin College has not only been employed in the usual diseases in which iron is prescribed, but has also been highly recommended as a remedy in dropsy, from the combination of its tonic with a diuretic power.

VINUM FERRI. Wine of Iron. Ph. Lond. (Vinum Ferri, *Ph. Dub.*)

"Take of Iron Filings, two ounces; Wine, two pints. Mix them together, and put aside for a month, shaking them frequently; then strain through paper." In the process given by the Dublin College, four ounces of iron wire cut, are mixed with four pints of Rhenish white wine; the iron being first sprinkled with a little of the wine until it is covered with rust, the remaining wine being then digested on it for seven days, and afterwards strained.

The tartaric acid of the wine contributes to the oxidation of the iron, and dissolves the oxide; and in the mode directed by the Dublin College, being aided by the action of the air, the oxidation, and consequent impregnation of the wine with iron, will probably take place to a greater extent. The acidity of the Rhenish wine will likewise contribute to this. Still the preparation must be liable to be variable in strength. It has been given as a chalybeate in a dose of one or two drachms.

ACETAS FERRI. Acetate of Iron. Ph. Dub.

"Take of Carbonate of Iron, half an ounce; Acetic Acid, three ounces. Digest them for three days, and strain the liquor."

In this process, the acetic acid dissolves the iron, and may afford a mild and active chalybeate, probably, how-

ever not differing much in its operation from the tartrate of iron. But, besides this, the Dublin College have ordered not less than two tinctures of acetate of iron.

TINCTURA ACETATIS FERRI. Tincture of Acetate of Iron. Ph. Dub.

"Take of Acetate of Potash, two ounces; Sulphate of Iron, one ounce; Rectified Spirit, two pounds. Rub together the acetate of potash, and the sulphate of iron, in an earthen mortar, until they form a mass of a soft consistence. Dry this with a moderate heat, and when dried, triturate it with the spirit. Digest the mixture in a phial closely corked for seven days, agitating it frequently. When the impurities have subsided, pour off the clear liquor."

TINCTURA ACETATIS FERRI CUM ALCOHOL. Tincture of Acetate of Iron with Alcohol. Ph. Dub.

"This is prepared in a similar manner, from one ounce of Sulphate of Iron, an equal weight of Acetate of Potash, and two pounds of Alcohol."

In the action of acetate of potash on sulphate of iron, the greater part of the acetic acid will be combined with the oxide of iron, forming acetate of iron, while the sulphuric acid is united with the potash, so as to form sulphate of potash, at least these binary combinations will be rendered more complete by the action of the alcohol added, sulphate of potash being nearly insoluble in that liquid, while acetate of iron can be dissolved. During the trituration, too, it is probable that the oxide of iron absorbs oxygen from the air, and the salt formed, therefore, will be the one containing the metal at the higher degree of oxidation, and which alcohol more easily dissolves. The tincture may have the advantage over the watery solution of acetate of iron formed by the preceding process, of being less liable to spontaneous decomposition; but it must be regarded as altogether superfluous to have two tinctures differing probably in little more than in strength, or indeed to have more than one

form of acetate of iron, if there was even any necessity for its introduction as an officinal preparation, which is doubtful.

LIQUOR FERRI ALKALINI. Alkaline Solution of Iron. Ph. Lond.

"Take of Iron, two drachms and a half; Nitric Acid, two fluid ounces; Distilled Water, six fluid ounces; Solution of Sub-carbonate of Potash, six ounces. Pour the acid and the water mingled together on the iron; and when the effervescence has ceased, pour off the liquor while still acid. Add to this gradually, and at intervals, the solution of sub-carbonate of potash, agitating frequently, until the colour, having become of a brownish red, effervescence is no longer excited. Put it aside for six hours, and then pour off the liquor."

This is a preparation which has long been known under the name of Martial Alkaline Tincture, and the nature of it is not very well ascertained. The iron is oxidated and dissolved by the nitric acid; and the solution which answers best for its preparation, appears to be that in which the iron is in a low state of oxidation, and in which there is an excess of acid; this is obtained by the solution being effected slowly, and, when in this state, it is of a pale green colour. On adding the sub-carbonate of potash, the alkali saturates a portion of the acid, and the oxide or rather sub-nitrate is precipitated, but by agitation it is kept suspended, and by the excess of alkali is redissolved, this being accompanied with effervescence from the disengagement of part of the carbonic acid. According to this view, therefore, the liquid is a ternary compound of oxide of iron, nitric acid and potash. It has often been remarked, however, by the chemists, that more of the precipitate is redissolved, when carbonate of potash is employed, than when pure potash is used; and this would lead to the conclusion that a portion of the carbonic acid is likewise retained in the combination, and probably contributes, by its action on the alkali and the oxide, to maintain the state of solution. On standing, a portion of

nitre, formed from the union of the potash and nitric acid is deposited, from which the clear liquor is to be poured off. As this preparation had nearly or altogether fallen into disuse, it is not obvious why it has been restored. No particular advantage is known to belong to it. From the variable state in which it is obtained, from the operation of very trivial circumstances in conducting the process, it must be liable to uncertainty of strength; and it has been stated by the older chemists, that on being kept, it deposits much of the iron,—a change very likely to happen from the metal passing to a higher state of oxidation. It appears therefore to be an injudicious preparation, and there is less necessity for it, as the preparations of iron in the Pharmacopœias are already more numerous than what are required in practice.

HYDRARGYRUS.—QUICKSILVER.

Hydrargyrus purificatus. Purified Quicksilver.

"Take of Quicksilver, four parts; Iron-Filings, one part. Rub them together and distil from an iron vessel." Similar directions are given in the other Pharmacopœias, except that in the Dublin one iron is not ordered, and the distillation of the quicksilver is continued only till three-fourths have passed over.

The quicksilver of commerce has been supposed to be frequently adulterated with other metals. To obtain it perfectly pure is the design of this process. The addition of the iron-filings renders the distilled quicksilver more bright and mobile, an effect not perfectly explained, but ascribed to the iron retaining combined with it any foreign metal, or any portion of carbon that might have been contained in the quicksilver. But the process is in reality not very necessary; for although quicksilver is easily adulterated, this does not appear to be often practised, what is met with in commerce being in gene-

ral nearly pure. The distillation, too, is rather difficult of execution, from the weight of the quicksilver and the high temperature that requires to be applied. Wherever there is reason, however, to suspect any impurity, the purification by this method ought to be performed.

ACETIS HYDRARGYRI. Acetite of Quicksilver. (Acetas Hydrargyri, *Ph. Dub.*)

"Take of Purified Quicksilver, three ounces; Diluted Nitrous Acid, four ounces and a half, or a little more than may be requisite to dissolve the quicksilver; Acetite of Potash, three ounces; Boiling water, eight pounds. Mix the quicksilver with the diluted nitrous acid; and towards the end of the effervescence, digest, if necessary, with a gentle heat, until the quicksilver be entirely dissolved. Then dissolve the acetite of potash in the boiling water, and immediately on this solution, while hot, pour the other, and mix them both by agitation. Then put aside, that crystals may be formed. These being placed in a funnel, wash them with cold distilled water; and, lastly, dry them with a very gentle heat.

"In preparing the acetate of quicksilver, it is necessary that all the vessels and the funnel which are employed should be of glass."

Acetic acid, like the other acids, combines with mercury in different states of oxidation, and forms salts which are different in their properties. When the metal is in a high state of oxidation, a salt is formed which is acrid and soluble; when in a lower state of oxidation, the salt obtained is more mild and sparingly soluble. The object of the present process is to obtain the latter of these salts: it may be doubted, therefore, if the application of heat to promote the solution of the mercury is proper, as it causes it, in dissolving, to pass to a too highly oxidated state. It has another disadvantage; that the acid being saturated with oxide, the solution is decomposed by water, and a sub-nitrite is precipitated; and accordingly this happens, when a solution, prepared with the aid of heat, is added to a solution of acetate of

potash. By employing an excess of acid, this is counteracted to a certain extent, and from this circumstance, the process, as given in the Edinburgh Pharmacopœia, may succeed. But by the solution being effected without heat, less acid is required; the process is more economical, and is equally successful, the mild acetate being copiously formed. On mixing the two solutions, the nitric acid of the nitrate of mercury combines with the potash of the acetate of potash, while the acetic acid unites with the oxide of mercury. The acetate of mercury remains at first dissolved, but on the liquid cooling a little, it appears in the form of delicate crystals, of a white colour and silvery lustre. Instead of employing boiling water to dissolve the acetate of potash, it is preferable to use only tepid water, as at a high temperature the water is liable to produce a partial decomposition of the acetate, so that it is of a yellow colour from a slight excess of oxide. It is necessary, too, not to continue to wash the salt after it is formed with much water, for a similar partial decomposition takes place, and the crystals become yellow. If this should happen, the brilliant whiteness is instantly restored by washing them with a little diluted distilled vinegar, the acetic acid neutralizing the excess of oxide to which the yellow colour is owing. With these precautions, the process, which often fails when they are not attended to, is easily conducted, and the preparation obtained perfectly uniform, and in a proper state.

Acetate of mercury crystallizes in small brilliant flakes. It is soluble in hot, and insoluble in cold water. As an antisyphilitic remedy, it is very mild in its operation; but its effects are not considered as sufficiently permanent to allow of its being relied on in effecting a radical cure. Its dose is a grain, night and morning.

MURIAS HYDRARGYRI, *olim Mercurius Sublimatus Corrosivus.* Muriate of Quicksilver. (Oxymurias Hydrargyri, *Ph. Lond.*—Murias Hydrargyri Corrosivum, *Ph. Dub.*)—Murias Hydrargyri Corrosivus. Corrosive Muriate of Mercury.

"Take of Purified Quicksilver, two pounds; Sulphuric Acid, two pounds and a half; Muriate of Soda, dried, four pounds. Boil the quicksilver with the sulphuric acid in a glass vessel placed in a sand-bath, until the matter become dry. Mix this when cold in a glass vessel with the muriate of soda; then sublime it in a glass cucurbit with a heat gradually raised. Separate the sublimed matter from the scoriæ." The same process is given in the other Pharmacopœias, rather a larger quantity of sulphuric acid (three pounds) being ordered by the Dublin College, perhaps with advantage, and a smaller quantity (two pounds and a half) of muriate of soda. If this quantity of muriate of soda is sufficient to afford the quantity of muriatic acid requisite to the saturation of the oxide of mercury in the sulphate, the reduction of it from the larger proportion ordered in the other Pharmacopœias will also be an advantage, as it will render it more easy to apply a due degree of heat in the subliming vessel to the whole mixture.

In the first stage of the process, the sulphuric acid, aided by the high temperature, oxidates the mercury, and combines with the oxide; the salt formed being that which contains the metal in a high state of oxidation. This salt, in its dry state, is mixed with muriate of soda, and, by the application of heat, a double decomposition is effected; the soda attracts the sulphuric acid, and the muriatic acid combines with the oxide of mercury. The muriate of mercury being easily volatilized, is separated from the sulphate of soda by sublimation. The process formerly employed in the preparation of this important mercurial salt, consisted in mixing together sub-nitrate of mercury, muriate of soda, and dried sulphate of iron, and subliming the muriate of mercury, formed by the re-action of these, by the application of a sufficient heat. The present process has been

substituted as more simple, and more economical, from the expense of the nitric acid in preparing the sub-nitrate of mercury being avoided. There is some reason to doubt, however, whether, from a given weight of mercury it affords the same quantity of product; a deficiency arising from the sulphate of mercury not containing a sufficient quantity of acid to decompose as much muriate of soda as is requisite to afford the muriatic acid necessary to convert the whole of the oxide of mercury into muriate. The enlarged proportion of sulphuric acid, and diminished proportion of muriate of soda, directed by the Dublin College, are perhaps in this respect useful.

This mercurial having long been established in medical practice, has been frequently submitted to chemical analysis. The earlier analysis were necessarily incorrect. The investigation of the composition of this and the other muriate of mercury was some years ago undertaken by Mr. Chenevix, and the relative proportions of their principles determined. It had been supposed by some chemists, that it is a compound of oxide of mercury with oxymuriatic acid; this supposition, he found no reason to admit; the compound consisting of mercury in a high state of oxidation united with muriatic acid; the oxide, which is its basis, he concluded, consists of 85 of mercury, and 15 of oxygen; and 100 parts of the salt are composed of 82 of this oxide, and 18 of muriatic acid. Its ultimate principles, therefore, and their proportions, are 18 of acid, 12.3 of oxygen, and 69.7 of quicksilver. Zaboada, from a more recent analysis, has inferred, that the oxide does not contain more than 10 of oxygen in 100 parts, and that 80 of this oxide are combined with 20 of acid. According to this, the ultimate principles and their proportions will be 20 of acid, 85 of oxygen, and 71.5 of quicksilver. Some other chemists have given results nearly the same.

The impropriety of the term Oxymuriate of Mercury, given to this salt by the London College, has been pointed out in the observations on the nomenclature of

the metallic salts. Neither is the name Muriate of Mercury, given to it by the Edinburgh College, sufficiently distinctive. In modern chemical writings, this name is even frequently given to the other Muriate of Mercury, in which the metal is at a lower state of oxidation,—a circumstance which must render this as a medical nomenclature extremely hazardous. The name Corrosive Muriate of Mercury is the one which deviates least from the principles on which the system of chemical language is established, and the one which ought to be adopted, considered in relation to its medicinal application, as affording the most marked distinction, and approaching nearest to the appellation by which it has been long known.

Corrosive muriate of mercury is obtained by sublimation in the form of a dense crystalline mass: when sublimed slowly, it condenses in slender prismatic crystals; and it is obtained in a similar form by crystallization from its watery solution. It is easily soluble in water, requiring 20 parts at 60° for its solution, and 2 parts at 212°. It is still more soluble in alcohol, requiring scarcely 4 parts at 60°. Its taste is acrid and metallic. It changes to a green several vegetable colours; is decomposed by the alkalis and earths, and by a number of compound salts, and likewise by vegetable infusions.

It is the most powerful of the mercurial preparations. Its dose cannot safely exceed the fourth of a grain, nor can more than one grain be given in twenty-four hours. As an antisyphilitic remedy it has long been established in practice, and it possesses some advantages. It acts speedily, and its action is more general on the system, or less determined to particular organs; these advantages have led to its frequent use, especially under the form of various empirical remedies, which have been employed in the treatment of syphilis. They are more than counterbalanced, however, by the occasional violence of its operation, and by the uncertainty which attends it, so that it cannot be relied on in establishing a permanent cure. It is given in the form of solution in water or al-

cohol, the dose being increased from the eighth to the fourth of a grain, night and morning, and mucilaginous diluents being freely taken, to lessen the irritation it is liable to occasion. As the solution has a very disagreeable taste, it is sometimes made into pills with crumbs of bread. In other diseases besides lues venerea, it is occasionally exhibited, particularly in cutaneous affections. Externally, its solution is employed as an escharotic in chancre and venereal ulcers of the mouth; and a very dilute solution of it has been used as an injection, to excite inflammation in obstinate gleet.

Liquor hydrargyri oxymuriatis. Solution of Oxymuriate of Mercury. Pharm. Lond.

"Take of Oxymuriate of Mercury, eight grains; Distilled Water, fifteen fluid ounces; Rectified Spirit, one fluid ounce. Dissolve the oxymuriate in the water, and add the spirit."

This formula is designed to afford a form of preparation under which corrosive muriate of mercury may be administered and its dose be easily regulated. An ounce contains half a grain; its dose therefore may be from one to two drachms.

Sub-murias hydrargyri, *olim Calomelas.* Sub-muriate of Quicksilver. (Sub-murias Hydrargyri, *Ph. Lond.*—Sub-murias Hydrargyri Sublimatum, *Ph. Dub.*)—Murias Hydrargyri Mitis. Mild Muriate of Mercury.

"Take of Muriate of Quicksilver, rubbed to powder in a glass mortar, four ounces; Purified Quicksilver, three ounces. Rub them together in a glass mortar, with a little water, that the operator may be guarded against the acrid powder which would otherwise arise, until the quicksilver is extinguished. Put the dried powder into an oblong phial, of which it shall fill only one third, and let it be sublimed in a sand-bath. The sublimation being finished, and the phial broken, the red powder at the bottom and the white one about the neck of it are equally to be rejected; the remaining mass

is to be again sublimed, and rubbed into a fine powder, which is lastly to be washed with boiling distilled water." The directions in the other Pharmacopœias are the same, except that in the London Pharmacopœia the sublimation is ordered to be twice repeated.

This is, perhaps the most important preparation of mercury, both from the certainty of its operation. its mildness, combined at the same time with sufficient activity, and the numerous indications it is capable of fulfilling. The process, by which it is obtained, too, is one that fortunately is little liable to be varied by circumstances, but affords an uniform product.

The ultimate result of the process, is to bring a quantity of metallic mercury into combination with the principles of corrosive mercury. In the corrosive muriate, the metal exists in a high state of oxidation, and this oxide is combined with a considerable proportion of muriatic acid. The additional proportion of quicksilver, triturated with it, appears to be quickly oxidated, for it soon loses its metallic form, and the whole is converted into a gray powder. By the application of the heat, which is necessary to produce sublimation, the combination is rendered complete; the quicksilver which is added, shares the oxygen of the oxide in the corrosive muriate, and the whole oxide, thus formed, combines with the muriatic acid, which the corrosive muriate contained. It is a general law, with regard to the combinations of acids with metallic oxides, that when the metal is highly oxidated, more acid is required to produce saturation, than when it is in a low state of oxidation. Hence, if the degree of oxidation in any saline metallic compound be reduced, less acid will be necessary to the constitution of the new compound in the neutral state, and this is well displayed in the present combination; for, although the quantity of base is increased, relatively to the acid, yet as this base is also brought into a lower state of oxidation, the portion of acid appears to be sufficient to produce saturation in the new compound; it gives no indication of being a sub-salt, has no tendency to combine

with a larger quantity of acid, nor apparently any power of neutralizing any additional proportion; it is of determinate composition, and is obtained in a crystalline form.

The product then of this process is a muriate of mercury, in which the metal is in a low state of oxidation, and in which this oxide is combined with a small quantity of muriatic acid.

This not inferred merely from the nature of the process by which it is formed, though it is sufficiently established by this; but it is likewise confirmed by its analysis. Mr. Chenevix determined the proportions of its constituent principles, by the same series of experiments by which he investigated the composition of the corrosive muriate. The oxide which is its base, he concluded, is composed of 89.3 of quicksilver, and 10.7 of oxygen; and in 100 parts of it, 88.5 of this oxide are combined with 11.5 of muriatic acid. Its ultimate principles, therefore, are 11.5 of acid, 9.5 of oxygen, and 79 of quicksilver;—proportions of oxygen and acid considerably less than what, according to the experiments of the same chemist, enter into the composition of corrosive muriate of mercury. It has already been stated, that the subsequent experiments of another chemist, Zaboada, afford the result, that less oxygen exists in the composition of the oxide, which is the base of the corrosive muriate, than what is assigned by Chenevix; and the same experiments afford a similar result with regard to the oxide which is the base of the mild muriate; but still they establish the same general difference between these two salts,—that in the mild muriate, or sub-muriate as it is named. the metal is less highly oxidated and the oxide is combined with a less proportion of muriatic acid. According to Zaboada, the oxide in the mild muriate contains little more than 5 of oxygen in 100 parts, and the salt itself is composed of 89.4 of this oxide with 10.6 of muriatic acid. Its ultimate principles are 10.6 of acid, 4.4 of oxygen, and 85 of quicksilver.

I have already pointed out the impropriety of the

name given by the Colleges to this compound, that of Sub-muriate, which is a violation of the principles on which chemical nomenclature is founded. The compound is not, as the name implies, a Sub-Salt; nor is its relation to the other salt, named Muriate of Mercury, such, that it can by any addition of acid be converted into it. As a medical nomenclature, it is still more objectionable, and the introduction of it is to be regretted, the merely prefixing the syllable *sub* not being sufficient to guard effectually against the dangerous mistake of confounding it with the other, from which it differs so widely. The name, Mild Muriate of Mercury, is under both points of view preferable, as has been already explained; though it will always be safer to prescribe it by the arbitrary name of Calomel, by which it has been long known.

The combination, whence the mild muriate of mercury is formed, is scarcely complete at the first sublimation; a portion of the quicksilver rises on the first application of the heat, and adheres to the portion of muriate condensed on the sides of the vessel, in minute globules; and a small quantity of unchanged corrosive muriate appears also to be diffused through the mass. The white powder mentioned in the formula of the Edinburgh Pharmacopœia, as collected in the neck of the matrass, is corrosive muriate, and is to be rejected; the red powder is oxide of iron, which, when the corrosive muriate is prepared by the medium of sulphate of iron, is diffused through it in minute quantity, but which will not be present when the corrosive muriate is prepared, as is now directed, from sulphate of mercury. To render the combination complete, the sublimed mass is reduced to powder, and is sublimed a second time. The London College order even a third sublimation, and the practice formerly was to sublime it six or seven times. This is, however, altogether unnecessary; and it has even been ascertained, that at each sublimation a little corrosive muriate is re-produced. After the second sublimation, any globules of quicksilver that may adhere to the mass

are removed; it is reduced to a fine powder by trituration and levigation with water, and is well washed with water, until the water pass off tasteless, and according to a test given by the Dublin College, give no indications of precipitation, from adding a few drops of a solution of carbonate of potash. A method has lately been introduced by Mr. Howard, of conducting the sublimation in an apparatus, so constructed, that the vapours are not condensed in the upper part of the vessel, forming a solid mass, but are condensed on the surface of water. The aggregation, whence a certain degree of ductility and hardness arises that renders difficult the levigation of the sublimate, is thus obviated; it is obtained at once, in the state of a fine powder, and any corrosive muriate that may rise with it is abstracted.

Mild muriate of mercury in its common form is in a dense cake, which is evidently an aggregate of short prisms: and when formed, in particular, by slow sublimation, these are very conspicuous. It is semi-transparent, has a slight yellowish colour, which is liable to be darkened by light, is somewhat ductile and very heavy, its specific gravity being 7.2. It is less volatile than the corrosive muriate; it appears to be altogether insoluble in water; at least Rouelle has stated, that above 1000 parts of water are required for its solution. When pure it is perfectly insipid.

As a mercurial, this preparation is extensively employed, its operation being sufficiently mild, and, at the same time, certain and active, and its use is only limited by the tendency which it has to occasion purging. As a remedy in syphilis, it is given in the dose of a grain night and morning, its determination to the intestines, being prevented, if necessary, by the addition of a little opium. It is the preparation which is most usually given in the other diseases in which mercury is employed, as in affections of the liver or neighbouring organs, in cutaneous diseases, chronic rheumatism, tetanus, hydrophobia, hydrocephalus, and in febrile affections, especially those of warm climates. It is in common use as a

cathartic, either by itself in a dose from five to ten grains, or in a smaller quantity to promote the operation of other purgatives. Its anthelmintic power is justly celebrated. And it is perhaps superior to the other mercurials in assisting the operation of diuretics in dropsy. From its great specific gravity, it ought always to be given in the form of bolus or pill.

Sub-murias hydrargyri præcipitatus. Precipitated Sub-muriate of Mercury. (Sub-murias Hydrargyri Præcipitatum. *Ph. Dub.*)

"Take of Diluted Nitrous Acid, Purified Quicksilver, of each eight ounces; Muriate of Soda, four ounces and a half; Boiling Water, eight pounds. Mix the quicksilver with the diluted nitrous acid; and, towards the end of the effervescence, digest with a gentle heat, shaking the vessel frequently. It is necessary, however, that more quicksilver should be mixed with the acid than this can dissolve, that the solution may be obtained fully saturated. Dissolve at the same time the muriate of soda in the boiling water: pour the other solution on this while warm, and mix them quickly together. After the precipitate subsides, pour off the saline liquor, and wash the sub-muriate of mercury, by frequently adding warm water, pouring it off after each time the precipitate subsides, until it come off tasteless." In the Dublin Pharmacopœia, the directions given are nearly the same, seven ounces of quicksilver being digested with five ounces of diluted nitrous acid, for six hours, and the liquor, at the end of this digestion, being made to boil for a short time, then poured off from the undissolved quicksilver, and added to a solution of muriate of soda in warm water.

The design of the process is to obtain mild muriate of mercury, the muriatic acid of the muriate of soda combining with the oxide of mercury, and forming this compound, while the nitric acid of the mercurial solution is saturated by the soda; and the advantages supposed to belong to it are, that it is more easily executed,

less expensive, and affords the product in a much finer powder than that obtained by sublimation can be reduced to. It was introduced on the authority of Scheele, and the directions which are given are those which he pointed out. The theory of metallic solutions was, however, in his time imperfectly understood, and the process to afford the proper product ought to be conducted in a very different manner.

Scheele was evidently misled by the analogy of dissolving a salt in water, the quantity dissolved being increased by heat; and hence, by aiding the action of the acid on the quicksilver by heat, it appeared to follow, that a larger product would be obtained, and that the acid being thoroughly saturated, the product would be more mild. Two circumstances, however, operate in this case, and give rise to other results.

1st, By digesting or boiling the acid on the metal, the decomposition of the acid is facilitated, and the mercury passes to a more highly oxidated state; hence, when the solution is added to the solution of muriate of soda, the degree of oxidation being too great to admit of the whole being converted into mild muriate, a portion of corrosive muriate is always formed. It has been observed, indeed, that although in the first stage of the solution much nitric oxide gas is disengaged, indicating a decomposition of the acid to a considerable extent, yet, that after this, an additional portion of quicksilver is dissolved without much effervescence, whence it has been concluded by some chemists, that this portion must receive oxygen from the portion already dissolved, and that the whole therefore will still exist in a low state of oxidation. The degree of oxidation may perhaps be so far reduced in this manner, but the fact is, that the mercury, in the solution thus prepared, is still too highly oxidated to be converted entirely into mild muriate when combined with muriatic acid; that a portion of it is always converted into corrosive muriate, and that with a solution so prepared, less muriate of mercury is obtained from a given weight of quicksilver, than from a

solution prepared entirely in the cold. I have ascertained this by experiment, the quantity of mild muriate obtained from a solution of one ounce of quicksilver in diluted nitric acid in the cold being a little more than an ounce, while from the same quantity dissolved with the application of heat, the precipitate did not much exceed half an ounce, while the liquor held dissolved much more corrosive muriate than the other.

2dly, When the solution of the quicksilver in the acid is promoted by heat, the acid is so completely saturated with oxide, that the solution is partially decomposed by mere dilution with water, a quantity of sub-nitrate being precipitated. Hence, when such a solution is mingled with the solution of muriate of soda, this decomposition will take place to a certain extent, from the operation of the water of the solution, and a quantity of this sub-nitrate must be mixed with the mild muriate, and must so far modify its powers.

These sources of error are obviated by using a solution of mercury prepared in the cold, and with a diluted acid; and from such a solution carefully prepared, the product, I have found, is almost entirely mild muriate, with very little corrosive muriate. The method of conducting the process in this manner is to add the quicksilver in small portions at a time to the nitric acid previously diluted with one part and a half of water, (observing the proportions given in the Edinburgh Pharmacopœia), and to avoid altogether the application of heat; when the solution is completed, or no more mercury appears to be capable of being dissolved, a little water is to be added, so as to dissolve any part of the nitrate of mercury that may have crystallized; the clear solution is poured off from the undissolved quicksilver, and is added to the solution of muriate of soda. The precipitate having subsided, is to be carefully washed with water, repeatedly poured on it, to carry off the small quantity of corrosive muriate that is formed. Berthollet has affirmed, however, that even as prepared from a solution of this kind, the precipitate retains in

combination a portion of nitric acid ; probably owing to the circumstance that such a solution must always have an excess of acid, part of which the precipitate, as it is formed, may attract. The process ought, on every account, perhaps to be expunged from the Pharmacopœias. It has no advantage, for it is not, as has been supposed, more economical. The fineness of the powder is of little importance, for by levigation the sublimed muriate is obtained sufficiently fine for medicinal use; and the process by sublimation gives a product perfectly uniform, while that by precipitation must always be liable to some uncertainty, from being so much influenced by the manner in which it is conducted. If it is ever followed, much attention should be made to washing the precipitate thoroughly, so that not the most minute portion of the corrosive muriate may remain mixed with it.

The precipitated mild muriate of mercury is in the state of a smooth powder, whiter, and of much less specific gravity than the muriate prepared by sublimation, differences probably depending on its state of aggregation. When pure, its medicinal operation must be the same. It has been said, from trials that have been made of it, to be more liable to occasion purging. If this difference exists, it is probably owing to the presence either of sub nitrate of mercury, or of a minute quantity of corrosive muriate.

Oxidum hydrargyri cinereum. Ash-coloured Oxide of Quicksilver. (Pulvis Hydrargyri Cinereus, *Ph. Dub.*)

"Take of Purified Quicksilver, four parts; Diluted Nitrous Acid, five parts; Distilled Water, fifteen parts; Water of Carbonate of Ammonia, as much as may be sufficient. Dissolve the quicksilver in the acid. Add gradually the distilled water. Then pour on as much of the water of carbonate of ammonia as may be sufficient to precipitate the oxide of quicksilver, which is to be afterwards washed with pure water and dried." The directions in the Dublin Pharmacopœia are similar, ex-

cept that the solution of the quicksilver in the acid is promoted by a gentle heat.

The action of ammonia on metallic salts is not perfectly similar to that of the other alkalis. It appears to have a greater tendency to unite with the oxide, and a portion of the acid, so as to form ternary combinations, and from its hydrogen attracting oxygen, it sometimes changes the constitution of the metallic oxide. These actions appear to be modified by the state of oxidation of the metallic salt, and this is well displayed in the effects it produces in the present process on the nitrate of mercury.

If the mercurial solution is in that state in which the metal is highly oxidated, on adding the ammonia, a precipitate is thrown down perfectly white. This was found by Fourcroy to consist of the oxide of mercury, in combination with a portion of acid and of ammonia, its composition, as he determined it, being 68.2 of oxide, 16 of ammonia, and 15.8 of nitric acid. But if the solution contain the metal in a low state of oxidation, the precipitate which is formed is of a dark blue colour approaching to black. This has been supposed to be merely the oxide of mercury that had been combined with the nitric acid, the ammonia combining with the acid, and precipitating the oxide. But an obvious objection to this opinion is, that the precipitate is not the same as that thrown down by potash or soda, but is of a more uniform colour, and darker, a proof that ammonia exerts some peculiar action in its production. According to Fourcroy, who investigated with considerable care these and other saline mercurial combinations, the ammonia, in precipitating the oxide from its combination with the acid, partially de-oxidates it, the hydrogen of a portion of the ammonia attracting part of the oxygen of the oxide, and reducing it to a still lower state of oxidation, approaching nearly indeed to the metallic state: hence there is at the same time a disengagement of a portion of nitrogen gas in consequence of this decomposition of a part of the ammonia, which when the process is per-

formed in the large way, produces an effervescence, and may be collected.

In frequently performing this process, it has appeared to me that this peculiarity of action by ammonia is exerted only when the mercurial solution contains the metal in a state of oxidation intermediate between the *minimum* and *maximum*. If care has been taken in preparing the solution, so as to have it with the metal dissolved at a very low degree of oxidation, the precipitate thrown down by potash is as dark in its colour as that by ammonia. But if it be somewhat more highly oxidated, that from ammonia is of a much darker colour, and there appears even a film on the surface, with a lustre approaching to metallic. The theory given by Fourcroy, of the operation of the ammonia, is therefore probably just, though I must add, that any effervescence indicating the disengagement of nitrogen gas is extremely slight, and on a small scale is scarcely apparent.

Some chemists have supposed, that the dark gray precipitate contains ammonia. When the precipitate, however, is properly prepared, and thoroughly washed, I have not been able to discover any trace of ammonia in it: when mixed with lime, or with a fixed alkali, no ammonia is exhaled even when heat is applied. If the solution, however, from which the precipitate has been thrown down, has been that in which the metal has been highly oxidated, part of the white triple compound described by Fourcroy will have been formed, and in this case a portion of ammonia is present. In decomposing mercurial solutions accordingly in this state, the precipitate at different stages of the precipitation is various in its colour, being at first gray, and afterwards lighter, and being more or less light as the solution contains the metal more highly oxidated, evidently from the predominance of the white precipitate. But any ammonia derived from this source is foreign to what properly constitutes the gray precipitate.

From the circumstances which influence this preparation not having been fully understood, it has been sup-

posed difficult to obtain it uniform; nor are the directions in the Pharmacopœia sufficiently precise. If the process be properly performed, it may, however, be obtained with certainty always the same. The nitrous acid ought to be diluted with rather more than an equal weight of water, so as to act on the quicksilver slowly, and with scarcely any sensible effervescence; the quicksilver should be added in small quantities at a time, and in as large a quantity ultimately as the acid can dissolve without the application of heat. When the solution appears to have ceased, the liquor is to be poured off from the undissolved quicksilver, and strained; it is to be diluted cautiously with water, as far as the dilution can be carried without impairing its transparency; and water of ammonia is to be added as long as any precipitation is produced. The precipitate is of a very deep gray colour, approaching to black; it is to be washed well with water, and dried. In drying, from exposure to the air and light, its colour becomes lighter; still it is a blue gray. In the shops it is usually of a light gray colour, and sometimes almost perfectly white, from the solution of mercury from which it has been precipitated containing the metal in too highly an oxidated state. The College order carbonate of ammonia to be employed in the precipitation; and it might be supposed from this, that the oxide thrown down will receive carbonic acid, and that the precipitate will be a carbonate or sub-carbonate. This, however, is not the case; the carbonic acid is disengaged, and the same precipitate is thrown down by pure ammonia. Some chemists have supposed, that the precipitate is produced with more certainty of a dark colour, when the ammonia is added in the state of carbonate; but this is a mistake, the darkness of the colour depending entirely on the degree of oxidation of the metal.

The London College have given the same name, Oxydum Hydrargyri Cinereum, to a preparation obtained by a different process, but supposed to be essentially the same. An ounce of Sub-muriate of Quick-

silver (Mild Muriate) is boiled in a gallon of Lime Water, stirring it constantly until the gray oxide of quicksilver subsides. This is washed with distilled water and is then dried.

This process has been had recourse to from the supposed difficulty of obtaining the gray oxide, by precipitation from nitrate of mercury by ammonia, uniform. It will afford a preparation sufficiently uniform, and so far similar to the other, that the oxide is in a low state of oxidation. But it is not at all probable, that the lime can abstract the whole of the muriatic acid, and it is probably, therefore, what is in strictness of nomenclature, a sub-muriate of mercury.

The Gray Oxide of Mercury has been introduced as a substitute for those preparations in which the metal is oxidated by trituration under exposure to the air, and has been supposed to have the advantage of more uniformity of strength, as the others are liable to be variable from imperfect preparation. When properly prepared, it appears to be the same in chemical composition, and the medicinal operation of it is also extremely similar. It is given in the dose of a grain night and morning, usually under the form of pill, and this answers very well as a substitute for the Mercurial Pill. An ointment formed from it, Unguentum Oxidi Hydrargyri Cinerei, has been introduced into the Edinburgh Pharmacopœia; one part of the gray oxide being mixed with three parts of lard. This is designed as a substitute for the Mercurial ointment, but it has been said not to be so easily forced through the cuticle by friction. It has also been used in the state of vapour from the application of heat, for fumigating venereal ulcers.

Oxidum hydrargyri rubrum per acidum nitricum, *olim Mercurius Præcipitatus Ruber*. Red Oxide of Quicksilver by Nitric Acid. (Hydrargyri Nitrico-Oxydum, *Ph. Lond.*—Oxydum Hydrargyri Nitricum, *Ph. Dub.*)

"Take of Purified Quicksilver, one pound; Diluted Nitrous Acid, sixteen ounces. Dissolve the quicksilver.

and evaporate the solution with a gentle fire to a white dry mass, which being reduced to powder, is to be put into a glass cucurbit, a thick glass plate being put over its surface. Then a capital being adapted, and the vessel placed in sand, apply to it a fire gradually raised, until it pass into very red small scales." The process in the Dublin and London Pharmacopœias is the same, equal weights of diluted nitric acid and quicksilver being ordered in the former, and in the latter a shallow vessel being ordered instead of a cucurbit, and the heat being aplied until the powder cease to exhale red vapours.

The quicksilver is in this preparation first oxidated by the nitrous acid, and the oxide then combines with the remaining acid. By the increase of heat, this nitrate is decomposed, and the greater part of the acid expelled, leaving a mass of a deep red colour. From the name of oxide given to this preparation by all the Colleges, it appears to be supposed, that the whole acid of the nitrate is expelled or decomposed, and that the residual matter is quicksilver combined with oxygen alone. This has never been established, however, by any accurate analysis of the preparation, and there are very obvious objections to it. Though a red oxide of mercury can be formed by the action of atmospheric air on the metal at a high temperature, it is quite different in its appearance from the product of the present process: and the latter is possessed of a considerable degree of escharotic power not belonging to the former, communicated probably by a portion of nitric acid combined with it. In all cases where a volatile ingredient is expelled from one more fixed by the application of heat, it is now known that the decomposition is scarcely ever complete, the influence of quantity operating, and causing a portion of the volatile ingredient to be retained, the quantity being greater as there is less difference in the volatility of the two substances. It follows, from this alone, as the most probable conclusion, that although the greater part of the nitric acid may be expelled from the oxide of

mercury, a portion of it will be retained, and it is probably impossible to expel the whole of it, without raising the heat to that point at which the oxygen itself will be expelled, and the quicksilver be reduced to the metallic form. I have accordingly found, that it does contain nitric acid. If the preparation be boiled for a short time with five or six times its weight of water, the liquor when filtered, has the styptic metallic taste, and gives a white precipitate with water of ammonia, or with carbonate of potash,—a plain proof that it holds dissolved nitrate of mercury; and to avoid any fallacy, the preparation submitted to experiment was that found in the shops, the product of the process on the large scale, of a bright red colour, and more perfectly prepared than that formed on the small scale. This must therefore be regarded as a sub-nitrate, and the proper appellation to be given to it is, Sub-nitras Hydrargyri Ruber, by which also it will be better distinguished from the proper red oxide. According to Payssé, 100 parts decomposed by heat afford 82 of mercury, and 18 of oxygen; this oxygen probably having an intermixture of nitrogen from the decomposition of the acid.

It has always been found very difficult to conduct this process, so as to obtain the product of that bright red colour and scaly appearance which are regarded as tests of its proper preparation. Much of the success depends apparently on the scale on which it is formed, the heat acting more steadily, and with more uniformity, on a large, than on a small quantity. When properly prepared, it is in scales of a bright red colour. It is so acrid as to be altogether unfit for internal administration. Externally it is employed as an escharotic, being applied either in a finely levigated powder, or mixed with lard in the form of ointment. This ointment, composed of one part with eight of lard, is officinal in the Edinburgh Pharmacopœia.

SUB-SULPHAS HYDRARGYRI FLAVUS, *olim Turpethum Minerale.* Yellow Sub-sulphate of Quicksilver. (Oxydum Hydrargyri Sulphuricum, *Ph. Dub.*)

"Take of Purified Quicksilver, four ounces; Sulphuric Acid, six ounces. Put them into a glass cucurbit, and boil in a sand-bath to dryness. The white matter remaining at the bottom of the vessel being reduced to powder, is to be thrown into boiling water. It will thus be converted into a yellow powder, which must be frequently washed with warm water."

By boiling sulphuric acid on quicksilver, the acid suffers a partial decomposition, oxygen being communicated from it to the metal, and sulphurous acid gas disengaged. The oxide of quicksilver is combined with the remaining acid, forming super-sulphate of mercury. By the continuance of the heat, this is partially decomposed, much of the acid is expelled, and a sub-sulphate of mercury remains. On this, boiling water is poured; and it acts as water does on many of the metallic salts. Having a stronger affinity to their acid than to their base, it decomposes the salt, abstracting the acid, and precipitating the oxide; but the influence of quantity on chemical affinity still so far operates in this decomposition, that the acid combined with the water retains a small portion of the oxide combined with it, and the oxide precipitated retains a portion of the acid. The entire compound, therefore, is resolved into a super-salt, which is dissolved, and a sub-salt which is thrown down. This happens in the present process; the water poured on the sulphate of mercury abstracts the acid, retaining in combination with it a portion of oxide, and forming therefore a super-sulphate of mercury, which remains dissolved, while a sub-sulphate is precipitated, and forms the yellow powder. The colour of this is more lively when hot water is used in its preparation, probably from the temperature favouring the chemical action of the water. The success of the process, with regard to the quantity of product, depends much on the sulphate of mercury having been deprived of all free acid previous

to the affusion of the water; for if it contain much acid, the greater part of the salt is dissolved without being decomposed. The proportion of acid ordered in the Pharmacopœia is unnecessarily large, and rather defeats the object of the process; an equal weight is sufficient, and the heat ought to be applied to the saline mass until it is perfectly dry. The super-sulphate dissolved in the water may be decomposed by potash; and a sub-sulphate precipitated.

Yellow sub-sulphate of mercury must, from the nature of the process by which it is obtained, be liable to variation in the proportions of its constituent principles. According to Fourcroy, it consists of 76 of mercury, 11 of oxygen, and 10 of acid, with 3 of water, while another analysis gives the proportion of acid at 15. As a medicine, it is too harsh in its operation to be administered internally, being liable to produce violent vomiting. It has sometimes, however been given as a powerful emetic, in a dose of five grains. It is an errhine, and has been employed as such, mixed with any mild vegetable powder, in some affections of the eyes.

SULPHURETUM HYDRARGYRI NIGRUM, *olim Æthiops Mineralis.* Black Sulphuret of Quicksilver (Sulphuretum Hydrargyri Nigrum, *Ph. Dub.*)

"Take of Purified Quicksilver, Sublimed Sulphur, of each equal weights. Rub them together in a glass mortar with a glass pestle, until the globules of quicksilver entirely disappear. It may be made likewise with a double proportion of quicksilver."

By this trituration a chemical combination appears to be effected between the quicksilver and sulphur, as the former loses completely its metallic form, and no globules can be perceived in the powder by the microscope. It has even been supposed, that the metal is at the same time imperfectly oxidated, and combined with sulphuretted hydrogen; but from the researches of Seguin, this does not appear to be the case. The combination is much facilitated by the application of heat, and it can at

once be effected, by adding the quicksilver to the melted sulphur.

This is the least active, perhaps, of the mercurial preparations. As an anthelmintic it is sometimes given in a dose of five or ten grains, and it has been used as an alterative.

Some additional preparations of mercury have a place in the London and Dublin Pharmacopœias, and are used in practice.

Hydrargyrus cum creta. Quicksilver with Chalk. Ph. Lond.

"Take of Purified Quicksilver, three ounces; Prepared Chalk, five ounces. Rub them together until the globules no longer appear."

Quicksilver, when triturated with any substance which aids the division of its globules, and extends their surface, appears to be susceptible of oxidation from the action of the atmospheric air, and the gray oxide formed by this operation is the basis of the common mercurial pill, as well as of some other preparations. More than one preparation of this kind, however, for internal administration, is superfluous; and the mercurial pill, prepared by trituration of the quicksilver with honey, manna, or mucilage, being that which has been long established in practice, is to be preferred. The present preparation has nothing peculiar to recommend it.

Hydrargyrum cum magnesia. Quicksilver with Magnesia. Ph. Dub.

"Take of Quicksilver, Manna, each one ounce; Magnesia, half an ounce. Triturate the quicksilver with the manna in an earthen mortar, adding as much water as will give to the mixture the consistence of syrup, and continuing the trituration until the mercurial globules are so far subdivided as to be no longer visible. Then add to the mixture a drachm of the magnesia, triturating

it constantly. After they are thoroughly mixed together, add a pound of hot water, and shake the mixture; allow the liquor to rest, and pour it off from the sediment which subsides. Repeat this washing twice, that the manna may be entirely removed; and while the sediment is still humid, add to it the remaining magnesia. Lastly, dry the powder on bibulous paper."

The object of this process is to obtain the oxidation of the mercury by trituration, and the interposition of the soft viscous matter of the manna with the addition of the water may facilitate this; the subsequent steps of the operation are designed to remove the manna, and obtain the gray oxide mixed with the magnesia. The same observation, applies, however, to this as to the preceding preparation,—that it is superfluous, and that for any useful purpose the mercurial pill will answer equally well. The only advantage, at least, of either process, is, that it may afford a mild preparation that can be given under the form of bolus, where a pill cannot be easily swallowed.

A preparation is likwise inserted in the Dublin Pharmacopœia, under the name of HYDRARGYRUM CUM CRETA, obtained in the same manner, only substituting precipitated chalk for magnesia.

HYDRARGYRI OXYDUM RUBRUM. **Red Oxide of Quicksilver.** Ph. Lond. (Oxydum Hydrargyri, *Ph. Dub.*)

"Take of Purified Quicksilver, one pound. Put the quicksilver into a glass vessel, with a narrow mouth, and broad at the bottom. Apply heat to this open vessel, raised to the six-hundredth degree, until the quicksilver pass into red scales; then rub these into a fine powder."

At the temperature at which quicksilver boils it combines with oxygen, and when heated to this temperature, under exposure to the air, red scales gradually form on its surface from this combination. There is a difficulty, however, in conducting the process; for if the quicksilver be freely exposed to the air, a considerable quantity

of it is lost, from its vapour being dissipated, especially if the heat be raised a little too high; while, on the other hand, if the air is not freely admitted, the oxidation cannot proceed. The method directed in the formula of the London and Dublin Colleges is the most effectual,—employing a glass vessel broad at the bottom, (so as to present the quicksilver under an extensive surface,) and with a long neck drawn out to a very small aperture, so that while the atmospheric air is admitted, the mercurial vapour will not so easily escape, the heat being applied by the medium of sand. Still the oxidation goes on very slowly, requiring the application of the heat for several weeks; and from the necessity of keeping up a steady heat without allowing it to become too strong, the conducting of the process requires considerable attention, and the preparation is comparatively high priced.

Red oxide of quicksilver is in scales of a dark brick red colour. When exposed to the heat of ignition it is decomposed, gives out oxygen, and the quicksilver returns to its metallic form. From the quantity of oxygen obtained by the reduction, Lavoisier inferred that the oxide contains seven parts of oxygen in 100 parts. It is a dangerous mistake which some have made, supposing the red scaly substance obtained from the decomposition of nitrate of mercury by heat to be essentially the same. The latter is much more acrid, and cannot be given internally with safety; and it is to be regretted, that the name of Oxide has been given to it, as it may sometimes lead to its substitution for the present preparation.

The red oxide prepared by heat, Calcined Mercury as it was formerly named, is a very active Mercurial. It has also been regarded as certain and permanent in its operation, and has therefore sometimes been employed in the treatment of secondary symptoms of syphilis, where the milder mercurials had failed. Its dose is one grain. It is liable, however, to produce irritation on the stomach or intestines, and from this, as well as from its high price, is not very frequently used.

HYDRARGYRUS PRÆCIPITATUS ALBUS. White Precipitate of Mercury. Ph. Lond. (Sub-murias Hydrargyri Ammoniatum, *Ph. Dub.*)

"Take of Oxymuriate of Quicksilver, Muriate of Ammonia, each half a pound; Solution of Sub-carbonate of Potash, half a pint; Distilled Water, four pints. First dissolve the muriate of ammonia, then the oxymuriate of mercury in the distilled water, and add to these the solution of sub-carbonate of potash; wash the powder which is precipitated, until it is free from taste; then dry it."

A process altogether different, but affording precisely the same product, is given by the Dublin College.

"To the liquor which has been poured off from the precipitated sub-muriate of mercury, add as much water of ammonia as is sufficient to precipitate the metallic salt. Wash the precipitate with cold distilled water, and dry it on bibulous paper."

When corrosive muriate of mercury is decomposed by ammonia, a white precipitate is thrown down, consisting of the oxide of the muriate, with portions both of acid and of ammonia combined with it; the proportions, according to Fourcroy's analysis of it, being 81 of oxide, 16 of muriatic acid, and 3 of ammonia. It is this precipitate which is formed in both the above processes. In the first, it may be conceived, that the potash of the sub-carbonate of potash, decomposes the muriate of ammonia, by combining with the muriatic acid, and that the ammonia evolved from this decomposes the muriate of mercury, throwing down the white precipitate the same as when ammonia is added directly to a solution of corrosive muriate; or, what affords a more simple, and perhaps a more just view, the potash attracts the acid, both of the muriate of mercury and muriate of ammonia, and the oxide of mercury is precipitated, retaining a portion of the acid combined with it, and having attracted the quantity of ammonia necessary to the constitution of the ternary compound. The other process, that in the Dublin Pharmacopœia, is simply the

decomposition of corrosive muriate of mercury by ammonia. In the preparation of the mild muriate of mercury by precipitation, it has already been stated, that if a solution of mercury in nitric acid be used, which has been prepared with the application of heat, and which therefore contains the metal more highly oxidated than the *minimum*, a portion of corrosive muriate of mercury is formed, when the solution is decomposed by muriate of soda. It is such a mercurial solution that is ordered in the Dublin Pharmacopœia for the preparation of the precipitated sub-muriate, and hence the liquor from which the precipitate subsides holds corrosive muriate dissolved. When decomposed, therefore, by ammonia, as directed by the present formula, it affords the ternary white precipitate. The name given to this preparation by the Dublin College is preferable to that in the London Pharmacopœia, which is altogether vague. Sub-Murias Hydrargyri et Ammoniæ is probably the correct appellation. The necessity of the presence of ammonia to its constitution is very well shown from the fact, that, if the corrosive muriate be decomposed by potash, it is a yellow precipitate that is thrown down; when it is decomposed by heat, ammonia and nitrogen are evolved.

This precipitate, when dried, forms a light white powder, which is tasteless and insoluble in water. It is used only externally, generally under the form of ointment, in some cutaneous affections.

HYDRARGYRI SULPHURETUM RUBRUM. Red Sulphuret of Quicksilver. Ph. Lond. (Sulphuretum Hydrargyri Rubrum, *Ph. Dub.*)

"Take of Purified Quicksilver, forty ounces; Sublimed Sulphur, eight ounces. To the sulphur melted over the fire, add the quicksilver, and as soon as the mass swells, remove the vessel from the fire, and cover it closely, that inflammation may not take place; then rub it into powder, and sublime." The same directions are given in the Dublin Pharmacopœia.

The inflammation which is taken notice of, as liable

to happen when the melted sulphur and quicksilver are mingled together, is probably not a real combustion, but the evolution of heat and light from their mutual action; this taking place in other cases of the combination of sulphur with metals, and being wholly unconnected, as has been sufficiently established, with any agency of the air. The covering of the vessel will therefore not check it, though the removal of it from the fire may do so, by reducing the temperature. and thus suspending the mutual action of the mercury and sulphur. If this should happen, the combination will probably therefore remain imperfect, and the process may succeed less perfectly, or at least succeed only from the action being renewed in the subsequent sublimation. The exclusion of the air must, however, be proper, as preventing a real combustion taking place, when the mass is so much heated. Different opinions have been maintained with regard to the nature of the ultimate product of this progress. Some chemists supposed, that the mercury exists in the state of oxide, in combination with the sulphur, and Vauquelin considered the bright red colour as arising even from a high degree of oxidation; this oxygen being supposed to be combined with the metal in the first stage of the process, when the apparent combustion takes place. This oxygenation, however, has never been clearly established. And according to Proust and Seguin, the compound is a pure sulphuret, consisting of 85 or 86 of quicksilver, with 15 or 14 of sulphur.

This substance, long known by the name of Cinnabar is of a vivid red colour, which becomes still more bright when it is reduced to powder. Its principal medicinal application is for mercurial fumigation. It is easily volatized by heat, and its vapour, directed on the surface of venereal ulcers, checks the progress of the ulceration; and where this is of importance, as from the situation of an ulcer it sometimes is, the practice is employed, a little of the powder being laid on a hot iron, and the vapour directed on the part.

PLUMBUM.—LEAD.

ACETIS PLUMBI, *olim Saccharum Saturni.* Acetite of Lead. (Plumbi Super-Acetas, *Ph. Lond.*—Acetas Plumbi, *Ph. Dub.*)

"Take of White Oxide of Lead, any quantity. Put it into a cucurbit, and pour upon it ten times its weight of Distilled Acetous Acid. Let the mixture stand on warm sand until the acid becomes sweet; pour it off, and add a fresh quantity successively, until it cease to acquire sweetness. Then evaporate the whole liquor, freed from impurities, in a glass vessel, to the consistence of thin honey, and put it aside in a cool place, that crystals may form, which are to be dried in the shade. Evaporate the remaining liquor, that there may be a new formation of crystals, and repeat this evaporation until no more are formed." The directions in the Dublin Pharmacopœia are similar. In the London Pharmacopœia, a pound of cerusse is ordered to be boiled in a gallon and a half of vinegar, until the acid is saturated; the liquor is then poured off, and evaporated until a pellicle appear on its surface, when it is put aside to crystallize. The process, however, is never attempted in the shops, but is conducted on a large scale, to furnish the salt for the purposes to which it is applied in the arts; distilled vinegar being either boiled on ceruse until the acid is saturated, or plates of lead being moistened with vinegar, or partially immersed in it, until they are incrusted with oxide, this oxide being dissolved by immersing the plates in the liquor, and a new quantity being formed by raising them to the surface. This is continued until the acid is saturated, and in either case the liquor is brought by evaporation to crystallize.

It is obvious, that in this process the acetic acid of the distilled vinegar combines with the oxide of lead. The salt which crystallizes was supposed to be the neutral acetate; but from more recent researches it appears to be a super acetate, and this name is accordingly given to it by the London College. The neutral acetate does

not crystallize easily ; and it was found by Thenard, whose attention was called to it, from this circumstance, that a slight excess of acid favours the crystallization, and that this excess of acid enters into the composition of the salt. It consists, according to the analysis of it by this chemist, of 58 oxide of lead, 26 acetic acid, and 16 of water, while the neutral salt is composed of 78 of oxide of lead, 17 acetic acid, and 5 of water.

This salt crystallizes in acicular prisms, and as prepared on a large scale, is usually in the form of masses composed of these crystals aggregated ; it is white, or of a light yellowish colour, with a silky lustre, is rather efflorescent ; it has a sweet taste, whence the name of Sugar of Lead, by which it has been known, this sweetness being accompanied with a degree of astringency. It is soluble in water, requiring about 24 parts at 60° for its solution; with spring water, the solution is milky, from a partial decomposition of the salt, by the minute quantity of sulphates or muriates contained in the water ; and even with distilled water the solution is not perfectly transparent, if a large quantity of the water be employed, the water, when its affinity to the acid is aided by its quantity, producing a slight partial decomposition.

Acetate, or rather super-acetate of lead, is employed principally as an external application. Its solution in water is used as a collyrium in ophthalmia, as an astringent injection in gonorrhœa, as a wash in superficial inflammation ; and dissolved in vinegar, it is employed as a discutient. These applications of it have already been pointed out under its medical history.

Liquor plumbi acetatis. Solution of Acetate of Lead. Ph. Lond.
(Liquor Sub-Acetatis Lithargyri, *Ph. Dub.*)

" Take of the Semi-vitrified Oxide of Lead (Litharge) two pounds four ounces ; Acetic Acid (Vinegar), one gallon. Mix them and boil down to six pounds, stirring constantly ; then put the liquor aside, that the impurities may subside, and strain it."

This preparation was introduced by Goulard, a French surgeon, under the name of Extract of Lead, as possessed of peculiar powers, and from the confidence with which it was recommended was established in practice. It was considered by the chemists as a solution merely of oxide of lead in acetic acid, analogous to the crystallized salt. But from the investigation of it by Dr. Bostock, it is proved to have no excess of acid, but to consist of the neutral acetate dissolved in water, and hence the solution is strongly impregnated with oxide of lead. One hundred parts of the saturated solution contain, according to his analysis, 23.1 of oxide, 5 of acetic acid, and 71.9 of water, while 100 parts of the saturated solution of the super-acetate contain 16.8 of oxide, 7.5 of acid, and 75.7 of water. The solution, or Goulard's Extract, as it is named, is of a brown colour. When kept, it becomes lighter, and deposites a quantity of oxide. It is used as a discutient, being mixed with vinegar and water, and frequently applied under the form of cataplasm. It forms also an application to inflamed surfaces, generally under the form of the following preparation, which has been admitted as officinal by the London College.

Liquor plumbi acetatis dilutus. Dilute Solution of Acetate of Lead. Ph. Lond.

"Take of Solution of Acetate of Lead, a drachm; Distilled Water, a pint; Proof-Spirit, a fluid drachm. Mix them."

This is what Goulard named absurdly Vegeto-Mineral Water, and which has been highly celebrated as an application in superficial inflammation. It is occasionally employed by surgeons, and some have thought it superior to a simple solution of acetate or super-acetate of lead.

ZINCUM.—ZINC.

CARBONAS ZINCI IMPURUS PRÆPARATUS, *olim Lapis Calaminaris Præparatus.* Prepared Impure Carbonate of Zinc, formerly Prepared Calamine Stone. (Calamina Præparata, Ph. Lond.—Lapis Calaminaris Præparatus, *Ph. Dub.*)

"Procure the Impure Carbonate of Zinc roasted, from those who prepare brass, and let it be prepared in the same manner as Carbonate of Lime."

Calamine is an ore of Zinc, the composition of which is variable. Some varieties of it appear to consist of oxide of zinc, combined with siliceous earth; but the more common varieties are composed of the carbonate more or less pure. When calcined by a moderate heat, it becomes friable so as to be more easily reduced to powder; and as this calcination is performed in preparing it for converting copper into brass by cementation, it is ordered in the Pharmacopœia to be obtained in this state, and then to be reduced to a fine powder by levigation, and washing in the same manner as carbonate of lime. Considerable care requires to be taken in this levigation, as the powder is applied to purposes, where, if it were coarse, it would prove irritating. It is used as an application to superficial inflammation and excoriation, dusted on the part, and it forms the basis of the common healing cerate, to which it communicates a degree of consistence and tenacity.

OXIDUM ZINCI IMPURUM PRÆPARATUM, *olim Tutia Præparata.* Prepared Impure Oxide of Zinc, formerly Prepared Tutty. Ph. Ed.

"Let Tutia be prepared in the same manner as Carbonate of Lime."

Tutia is a substance, the origin of which is somewhat doubtful; it consists of oxide of zinc with argillaceous earth; and the most probable account with regard to it is, that it is the sublimate collected in the chimneys in which zinc is calcined, mixed with clay and water, and

baked. It is used externally for the same purposes as calamine, and hence requires to be well levigated.

Oxidum Zinci. Oxide of Zinc. (Zinci Oxydum, *Ph. Lond.*—Oxydum Zinci, *Ph. Dub.*)

"Let a large crucible be placed in a furnace filled with burning fuel, in such a manner that it shall be somewhat inclined to its mouth; and, when the bottom of the crucible is at a moderate red heat, throw in a piece of zinc, about the weight of one drachm. The zinc soon inflames, and is converted into white flocculi, which are to be removed, from time to time, from the surface of the metal, with an iron spatula, that the combustion may proceed more perfectly; and when the inflammation ceases, remove the oxide of zinc from the crucible. Another piece of zinc being thrown in, the operation is to be renewed and repeated as often as may be necessary. Lastly, let the oxide of zinc be prepared in the same manner as carbonate of lime." In the London and Dublin Pharmacopœias, the crucible is directed to be covered with another one inverted over it, but so as to admit the air,—a direction not easily observed, as the zinc requires to be stirred to renew its surface, and keep up the combustion.

Zinc is the most inflammable of the metals. At the temperature of ignition, it attracts the oxygen of the atmospheric air, and burns vividly with a white and green light, producing an oxide in very light flocculi, which are in part carried off by the rapid current of air arising from the burning zinc. This oxide accumulates so rapidly, that it must be withdrawn to allow the combustion to proceed. Particles of metallic zinc are intermingled with it, and hence the necessity of submitting it to levigation. It is light, white, tasteless, and insoluble in water, and contains about 20 of oxygen in 100 parts. In medicine it is employed principally as an antispasmodic in epilepsy and chorea. It dose is from two to five grains twice a-day, and this gradually increased. It also forms the basis of a healing cerate.

Sulphas zinci, *olim Vitriolum Album.* Sulphate of Zinc. (Zinci Sulphas, *Ph. Lond.*—Sulphas, Zinci, *Ph. Dub.*)

"Take of Zinc, cut into small pieces, three ounces: Sulphuric Acid, five ounces; Water, twenty ounces. Mix them, and the effervescence being finished, digest for some time on warm sand. Then strain the liquor through paper; and, after due exhalation, put it aside that crystals may be formed."

The sulphuric acid in this process, by a resulting affinity, enables the zinc to decompose the water, attracting its oxygen, the hydrogen being disengaged with effervescence: the oxide combines with the acid, forming the sulphate, and by the evaporation this is obtained in acicular crystals. The process, however, is scarcely ever performed in the shops, the sulphate of zinc being prepared on a large scale, from certain varieties of the native sulphuret of the metal. These are roasted, and exposed to air and humidity; oxygen is absorbed, the zinc is oxidated, and the sulphur converted into sulphuric acid; and the sulphate of zinc is extracted by lixiviation. Its solution is evaporated so far, that on cooling, the sulphate of zinc concretes in a granular mass, forming the white vitriol of commerce. It usually contains a little sulphate of iron, and sometimes, it has been supposed, a portion of sulphate of copper and of lead. From the insolubility of the latter salt, it can scarcely be present; the sulphate of copper is scarcely ever to be discovered, and the sulphate of iron is in small quantity, and cannot communicate any injurious quality. And as sulphate of zinc is principally employed externally, the neglect of this process, and the substitution of the common white vitriol, is of less importance.

Sulphate of zinc is used principally as an astringent, in the form of solution; as an injection in gonorrhæa, and a colyrium in ophthalmia: sometimes also internally as an emetic. These applications of it have been already considered.

Solutio sulphatis zinci. Solution of Sulphate of Zinc.

"Take of Sulphate of Zinc, sixteen grains; Water, eight ounces; Diluted Sulphuric Acid, Sixteen drops. Dissolve the sulphate of zinc in water; then the acid being added, strain through paper."

This solution is designed to be used as a collyrium in ophthalmia, the sulphuric acid dissolving any excess of oxide that may be present in the common sulphate of zinc, if it be employed, and coinciding with it in astringency. As an injection in gonorrhœa, the solution, without the acid, is preferable, as sufficiently astringent and less irritating.

Solutio acetitis zinci. Solution of Acetite of Zinc.

"Take of Sulphate of Zinc, one drachm; Distilled Water, ten ounces. Dissolve it. Take also of Acetite of Lead, four scruples; Distilled Water, ten ounces. Dissolve it. Mix the solutions. Let the liquor remain at rest a little; then strain it."

Sulphate of zinc and acetate of lead being the two astringent salts which usually form the basis of the astringent injection employed in gonorrhœa, they had frequently been conjoined in one formula, without the prescriber perhaps being always aware of the decomposition they suffer. The solution, however, was found to answer sufficiently well, being astringent without proving irritating. The use of it led to the introduction of the present process, in which the proportions are properly adjusted. The two salts exchange their principles, the sulphuric acid of the sulphate of zinc combining with the oxide of lead of the acetate of lead, while the acetic acid unites with the oxide of zinc: the sulphate of lead being insoluble, is precipitated, and is removed by filtration; the acetate of zinc remains dissolved.

Tinctura acetatis zinci. Tincture of Acetate of Zinc. Ph. Dub.

"Take of Sulphate of Zinc, one ounce; Acetate of Potash, the same quantity. Triturate them together, and add of Rectified Spirit, one pint. Macerate for a week, agitating the liquor frequently, and strain it through paper."

In this process a similar decomposition takes place, the sulphuric acid of the sulphate of zinc combining with the potash of the acetate of potash, while the acetic acid enters into union with the oxide of zinc. The spirit dissolves the acetate of zinc, while the sulphate of potash remains in a great measure undissolved. The solution is strongly impregnated with the metallic salt, and a collyrium or injection of the usual strength may be prepared extemporaneously, by adding a certain proportion of it to water. The formula appears, however, to have no advantage over the more direct and simple method given by the Edinburgh College.

STANNUM.—TIN.

Pulvis stanni. Powder of Tin. Ph. Dub.

"Take of Tin, any quantity. Having melted it in an iron mortar, agitate it as it cools, until it is reduced to powder, which, when cold, is to be passed through a sieve."

Tin, when heated near to its melting point, becomes extremely brittle, so as to be easily reduced to fragments. When melted, therefore, if stirred or agitated as it becomes solid, this effect is obtained, and a granular powder is formed more easily than by any other method. Its powers as an anthelmintic have been already considered.

ARSENICUM.—ARSENIC.

Arsenici oxydum præparatum. Prepared Oxide of Arsenic. Ph. Lond.

"Triturate Oxide of Arsenic into powder; then put it into a crucible, and applying heat, sublime it into another crucible placed over the former."

Oxide of arsenic is usually obtained by sublimation from the ores of cobalt in which it is contained, and which are roasted with the view of obtaining the oxide of cobalt for the purposes to which it is applied in the arts. The arsenical oxide is collected in the chimney and flues of the furnace; it is impure, but is usually purified by sublimation before it is brought to the shops, and is in the state either of a solid cake or a powder. Oxide of arsenic is a substance so very active, that any foreign matter it can contain in this state can be of no importance, and the present process is altogether superfluous. Its properties and medicinal applications have been already considered.

Liquor arsenicalis. Arsenical Solution. Ph. Lond.

"Take of Prepared Oxide of Arsenic, rubbed to a very fine powder, Sub-carbonate of Potash from Tartar, of each sixty-four grains; Distilled Water, a pint. Boil them together in a glass vessel until the arsenic is entirely dissolved. To the solution when cold, add Compound Spirit of Lavender, four fluid drachms. Then add as much Distilled Water as may be necessary to make up the measure of a pint."

The substance named Oxide of Arsenic has by some chemists been considered as an acid, and named Arsenious Acid. It is not, like the greater number of oxides, insipid and insoluble in water, but has a sharp taste and is soluble in not more than 80 parts of cold, and 15 of boiling water. It reddens the more delicate vegetable colours, particularly the infusion of litmus, and it combines with the alkalis. The alkaline properties, however,

do not appear to be neutralized in these combinations; and it even neutralizes, as Berthollet affirms, the acids in combining with them. And hence, on the whole, it is to be regarded as an oxide in a high degree of oxidation. By combination with potash it is rendered soluble in water, and to render the solution of it perfect, and obtain it in a form in which its dose can be easily regulated, is the object of the present process. The formula was introduced by Fowler, as giving a substitute for the arsenical preparation, known under the name of Tasteless Ague Drop. Each ounce of the solution contains four grains of the oxide. The dose is four drops three times a day, as a remedy in intermittent fever, given with the precautions which have been pointed out under its medical history. The spirit of lavender is designed merely to communicate colour and flavour; but it would have been better to have added some other tincture, the flavour of which is less commonly known, and the taste less grateful, so as to have guarded against the possibility of the solution being incautiously swallowed.

ARSENIAS KALI. Arseniate of Potash. Ph. Dub.

"Take of White Oxide of Arsenic, Nitrate of Potash, each one ounce."

Reduce them separately to powder; mix them, and put the mixture into a glass retort, placed in a sand-bath, and apply heat, raising it gradually until the bottom of the retort is obscurely red. The vapours which arise should, by an apparatus adapted to that purpose, be transmitted through distilled water, that the nitrous acid disengaged by the heat may be condensed. Dissolve the residual matter in four pounds of boiling distilled water, and after due evaporation put it aside, that crystals may form.

Arsenic, by a high degree of oxygenation, acquires unequivocally the properties of an acid. This acid, the Arsenic, as it is named, is formed by distilling nitrous acid from the oxide of arsenic, the nitrous acid yielding

to the oxide the requisite proportion of oxygen. The same change is produced by the present process; the nitrous acid being decomposed, the oxide of arsenic acquiring from it as much oxygen as converts it into arsenic acid, and this acid remaining combined with the potash of the nitre. The residual mass, therefore, when a sufficient degree of heat has been applied to expel or decompose the whole of the nitrous acid, is arseniate of potash. This salt is very soluble in water, and crystallizable. By evaporation of its solution it is obtained in large regular crystals, their figure being a tetraedral prism: in this form, and as obtained by this process, the salt has generally a slight excess of acid; when perfectly neutral, it does not crystallize so easily.

Under this form, as well as under that of the preceding preparation, arsenic has been employed as a remedy in intermittent fever, and in some cutaneous diseases. The dose is from one-sixteenth to one-eighth of a grain of the crystallized salt. It does not appear to have any advantage, however, over the more simple preparation.

CHAPTER XXI.

PULVERES.—POWDERS.

This is the simplest form of composition of medicines, the different articles being merely reduced to powder, and mixed together. It is adapted to the exhibition of such remedies as are not ungrateful, and such as are not liable to lose their virtues by keeping; and is usually an improper form for those which are bitter, acrid, or fœtid, which require to be given in a large dose, or which are not easily diffused in water, the vehicle in which powders are usually taken. The dose of a powder seldom exceeds a drachm; and if it require to be given only in a few grains, it is better that

it should be under the form of bolus. When it is to be taken, it is merely diffused in water, wine, or any other convenient vehicle.

PULVIS AROMATICUS. Aromatic Powder. (Pulvis Cinnamomi Compositus, *Ph. Lond.*—Pulvis Aromaticus, *Ph. Dub.*)

"Take of Bark of Cinnamon, Cardamom Seeds, Ginger Root, of each equal parts. Rub them into a very fine powder, which is to be kept in a glass phial well stopt." In the London and Dublin Pharmacopœias the proportion of cinnamon is larger, and a small quantity of long pepper is likewise added.

This combination of aromatics is designed merely to communicate to other compositions fragrance and pungency, and to obviate the nausea which ungrateful medicines are liable to excite. The quantity added to a dose is generally about five grains.

PULVIS ASARI COMPOSITUS Compound Powder of Asarabacca. (Pulvis Asari Compositus, *Ph. Dub.*)

"Take of the Leaves of Asarabacca, three parts; the Leaves of Marjoram, Flowers of Lavender, of each one part. Rub them together to a powder." In the composition which has a place in the Dublin Pharmacopœia, the leaves of marjoram are omitted.

This is used as a mild errhine, forming the composition known by the name of Herb Snuff. When snuffed in the quantity of a few grains, it occasions sneezing and a discharge of mucus, and is sometimes used in headach and ophthalmia.

PULVIS CARBONATIS CALCIS COMPOSITUS, *olim Pulvis Cretaceus.*

"Take of Prepared Carbonate of Lime, four ounces; Bark of Cinnamon, one drachm and a half; Nutmeg, half a drachm. Rub them together to powder."

This is designed to be used as a grateful antacid. It is given in the dose of one drachm.

PULVIS CRETÆ COMPOSITUS. Compound Powder of Chalk. Ph. Lond.

"Take of Prepared Chalk, half a pound; Bark of Cinnamon, four ounces; Tormentil Root, Gum-Arabic of each three ounces; Long Pepper, half an ounce. Reduce them separately to powder, and mix them."

This composition, though analogous to the preceding one, is so far different as to require to be noticed apart, the proportion of the aromatics being larger, and the addition of the tormentil root rendering it more astringent. It is used to relieve diarrhœa arising from acidity being given in the dose of half a drachm or a drachm.

PULVIS CRETÆ COMPOSITUS CUM OPIO. Compound Powder of Chalk with Opium. Ph. Lond.

"Take of Compound Powder of Chalk, six ounces and a half; Hard Opium, rubbed to powder, four scruples. Mix them."

The addition of opium to astringents and antacids, when given in diarrhœa, is a common practice, and this formula affords a convenient composition of this kind. Its dose is one scruple, or half a drachm. Two scruples contain one grain of opium, the proportion having been diminished a little from what it was in former editions of the Pharmacopœia.

PULVIS JALAPÆ COMPOSITUS. Compound Powder of Jalap.

"Take of the Powder of the Root of Jalap, one part; Super Tartrate of Potash, two parts. Rub them together into a very fine powder."

This combination affords an excellent purgative, less stimulating, and less liable to excite griping than the jalap alone. It is given in the dose of a drachm or a drachm and a half; and in dropsy, as a hydragogue cathartic, to the extent of two drachms.

PULVIS IPECACUANHÆ ET OPII, *olim Pulvis Doveri.* Powder of Ipecacuanha and Opium. (Pulv. Ipecacuanhæ Compositus, *Ph. Lond. Dub.*)

"Take of the Powder of the Root of Ipecacuanha, Opium, of each one part; Sulphate of Potash, eight parts. Rub them together into a fine powder."

This composition, Dover's Powder, has long been established in practice, and is one of those useful combinations, which experience, or rather accident discovers, the powers of which could not have been inferred *à priori* from the known operation of its ingredients. It affords one of the best examples of the power which one medicine has of modifying the action of another, the ipecacuan rendering the operation of the opium, as a sudorific, much more certain than it otherwise would be, and appearing also to diminish its narcotic effect, so that the composition can be given with safety in pure inflammatory affections, in which opium alone would be hazardous. The sulphate of potash serves to divide the particles of the opium and ipecacuan, and mix them more intimately; and such is the advantage derived from it, that, as Dr. Blane has remarked, the opium and ipecacuan alone, mixed in the above proportions, have not the same effect. Hence, too, the operation of the powder is always more certain when it has been triturated to a great degree of fineness. This powder is the most powerful and certain sudorific we possess. Its medium dose is fifteen grains, the operation of which is to be assisted by the sweating regimen; and frequently it is necessary to give additional smaller doses at intervals, to produce sweat. Its principal use is in acute rheumatism; but it is prescribed in all cases with propriety where full sweating is to be induced.

PULVIS OPIATUS. Opiate Powder.

"Take of Opium, one part; Prepared Carbonate of Lime, nine parts. Rub them together to a fine powder."

This is designed as a convenient form for administer-

ing opium. Ten grains contain a grain of opium, and form a medium dose. It is however little used.

PULVIS CORNU USTI CUM OPIO. Powder of Burnt Hartshorn with Opium. Pharm. Lond.

"Take of Hard Opium rubbed to powder, one drachm, Burnt and Prepared Hartshorn, an ounce; Cochineal in powder, a drachm. Mix them."

This, in the former edition of the Pharmacopœia, had the name of Pulvis Opiatus, which has been changed to its present appellation, as less liable to being confounded with Powder of Opium. A little cochineal is also added to give it colour. The burnt hartshorn serves to divide the opium, and from its hardness and grittiness is better adapted to this than the chalk of the preceding preparation. One grain of opium is contained in ten of the powder.

PULVIS SCAMMONII COMPOSITUS. Compound Powder of Scammony.

"Take of Scammony, Super-Tartrate of Potash, of each equal parts. Rub them together into a very fine powder."

Scammony given alone, is liable to act as a purg tive rather with violence, while its operation is at the same time somewhat uncertain. By the addition of the super-tartrate of potash, its cathartic operation is rendered more certain and less irritating. It is also preferred to the scammony alone, as a hydragogue cathartic. Its dose is from ten to twenty grains.

PULVIS SCAMMONII COMPOSITUS. Compound Powder of Scammony. Pharm. Lond.

"Take of Scammony, Hard Extract of Jalap, of each two ounces; Ginger, half an ounce. Rub them separately into a very fine powder, then mix them."

This composition, though under the same name as the preceding one, is of a very different nature; the sti-

preparation. One part of opium is contained in twenty, and it may be given in a dose from ten to twenty grains.

Pulvis sennæ compositus. Compound powder of Senna. Pharm. Lond.

"Take leaves of Senna, Super-Tartrate of Potash, of each two ounces; Scammony, half an ounce; Ginger, two drachms. Rub the scammony separately, the others together, into a fine powder, and mix them."

This may be employed as a purgative, in a dose of from half a drachm to a drachm. The senna is, however, a substance so inferior in power to the scammany, that there appears to be little advantage in their combination, nor is the form of powder well adapted to their exhibition.

Pulvis tragacanthæ compositus. Compound Powder of Tragacanth. Pharm. Lond.

"Take of Tragacanth, rubbed to powder, Gum Arabic in powder, Starch, of each one ounce and a half; Refined Sugar, three ounces. Triturate the starch and sugar together into powder, then having added the tragacanth and the gum Arabic, mix them all together."

This combination of mucilaginous substances may be employed for the general purposes of demulcents, in the dose of a drachm, or two drachms, frequently repeated. But it appears to be a very superfluous composition.

CHAPTER XXII.

ELECTUARIA.—ELECTUARIES.

This term is applied to that form of compound medicines where the consistence is nearly that of thick honey. An electuary is composed, in general, of a powder reduced to the proper consistence by the addition

of syrup or mucilage. It is a proper form for administering medicines which are not very disagreeable in their taste or flavour; and, except in a few officinal preparations, it is an extemporaneous prescription, as when long kept it is liable to become too thick and adhesive from the evaporation of part of its moisture. Dry powders generally require twice their weight of syrup to bring them to the due consistence; and syrup is preferable to mucilage, as the electuary made with the former does not so soon become dry. The common dose of an electuary rarely exceeds two tea-spoonfuls, and is seldom less than a tea-spoonful; any very active medicine, which requires to be given in a smaller dose, being usually administered under the form of bolus.

The London College have united the electuaries with the Conserves, as they are both compositions of vegetable matter with sugar, and are of similar consistence; and have given to them the common name of Confections. In conserves, however, the addition of the saccharine matter is in much larger proportion, and is designed to preserve the vegetable matter; in electuaries, the syrup is designed merely to communicate the required form. The Edinburgh College retain the distinction of conserves, and the individual preparations which have this name have been already considered.

Electuarium aromaticum. Aromatic Electuary. (Confectio Aromatica, *Ph. Lond.*—Electuarium Aromaticum, *Ph. Dub.*)

"Take of Aromatic Powder, one part; Syrup of Orange-Peel, two parts. Mix, beating them well together, so as to form an electuary." The composition which has a place in the other Pharmacopœias is somewhat different. The following is the formula given by the London College: "Take of Cinnamon Bark, Nutmegs, each two ounces; Cloves, one ounce; Cardamom Seeds, half an ounce; Saffron dried, two ounces; Prepared Shells, sixteen ounces; Refined Sugar, two pounds; Water, a pint. Triturate the dry substances together

into a fine powder, then add the water gradually, and mix them so as to form an uniform mass."

The composition of the Edinburgh Pharmacopœia is the more simple of these; and in that of the London Pharmacopœia, the carbonate of lime is foreign to the object of the combination, though, as it has long had a place, it is still retained. Either electuary is a grateful aromatic preparation, frequently combined with other medicines, or made the basis of cordial or carminative mixtures, requiring merely for this purpose to be diffused in water with a little syrup.

Electuarium cassiæ fistulæ. Electuary of Purging Cassia. (Confectio Cassiæ, *Ph. Lond.*—Electuarium Cassiæ, *Ph. Dub.*)

"Take of the Pulp of Cassia in pods, four parts; Pulp of Tamarinds, Manna, of each one part; Syrup of Pale Rose, four parts. Dissolve the manna beat in a mortar, with a gentle heat, in the syrup; then add the pulps, and, by a continued heat, reduce the mixture to a proper consistence." The composition with regard to the ingredients is the same in the other Pharmacopœias.

This electuary affords a mild laxative, which operates in the dose of an ounce. From the predominance of the pulps and the saccharine matter, it is liable, however, to become sour on keeping; it is also inferior in activity to the next electuary, which is equally pleasant, and hence, it is so little used, that it is never found in the shops.

Electuarium cassiæ sennæ, *olim Electuarium Lenitivum.* Electuary of Senna. (Confectio Sennæ, *Ph. Lond.*—Electuarium Sennæ, *Ph. Dub.*)

"Take of the Leaves of Senna, eight ounces; Coriander Seeds, four ounces; Liquorice Root, three ounces; Figs, Pulp of Prunes, of each one pound; Pulp of Tamarinds, half a pound; Refined Sugar, two pounds and a half. Bruise the senna with the coriander seeds, and separate by passing through a sieve ten ounces of the mixed powder. Boil the residuum with the figs and

the liquorice in four pounds of water to one half; then express and strain. Reduce the strained liquor by evaporation, to about a pound and a half. Afterwards add the sugar so as to make a syrup. Add this syrup gradually to the pulps, and, lastly, mix in the powder." The composition in the London Pharmacopœia is the same, with the addition of half a pound of Pulp of Cassia. In the Dublin Pharmacopœia it is different; the ingredients being, Senna Leaves in fine powder, four ounces; Pulp of Prunes, a pound; Pulp of Tamarinds, two ounces; Syrup of Brown Sugar (Molasses), a pint and a half; Essential Oil of Carraway, two drachms.

This electuary is in very common use as a mild and pleasant purgative. Its dose is six drachms, or an ounce; and it is sometimes rendered more active by the addition of a little jalap, or super-tartrate of potash. The electuary of the Dublin Pharmacopœia, though more simple than the others, must be less grateful, from containing so large a proportion of molasses; and the oil of carraway will communicate rather too much pungency to a medicine in this form.

Electuarium mimosæ catechu, *olim Confectio Japonica.* Electuary of Catechu. (Electuarium Catechu Compositum, *Ph. Dub.*)

"Take of Extract of Catechu, four ounces; Kino, three ounces; Bark of Cinnamon, Nutmeg, of each one ounce; Opium, diffused in a sufficient quantity of Spanish White Wine, one drachm and a half; Syrup of Red Rose, boiled to the consistence of honey, two pounds and a quarter. Reduce the solid ingredients to powder, and, mixing with them the opium and syrup, form an electuary." In the Dublin Pharmacopœia, the nutmeg is omitted, the quantity of cinnamon being proportionally increased, and the Syrup of Ginger is substituted for Syrup of Rose: the proportion of opium is the same.

In this electuary, the more powerful vegetable astringents are combined; they are rendered more grateful by

the addition of the aromatics, and the efficacy of the composition, as a remedy in diarrhœa, is increased by the opium. It is the basis of the common extemporaneous astringent mixture; two drachms of it being diffused with a little syrup in six ounces of water, and a table spoonful of this being taken three or four times a day. One grain of opium is contained in rather more than three drachms.

ELECTUARIUM OPIATUM, *olim Ectuœrium Thebaicum.* Opiate Electuary. (Confectio Opii, *Ph. Lond.*)

"Take of Aromatic Powder, six ounces; Virginian Snake-root, rubbed to a fine powder, three ounces; Opium diffused in a sufficient quantity of Spanish White Wine, half an ounce; Syrup of Ginger, one pound. Mix, so as to form an electuary." The formula in the London Pharmacopœia is somewhat different from this. It prescribes of "Hard Opium, rubbed to powder, six drachms; Long Pepper, an ounce; Ginger-root, two ounces; Carraway Seeds, three ounces; Syrup, a pint. Triturate the opium with the syrup heated, then add the other ingredients ground to powder, and mix them."

This is a substitute for compositions once highly celebrated, and which have long kept their place in the Pharmacopœias of Europe, the Mithridate and Theriaca, and which at one period consisted of above an hundred ingredients. Opium appeared, amid this farrago, to be the ingredient of predominating power, modified principally by aromatics; they have been, therefore, gradually reformed into the present preparation, and even it is scarcely used. Each drachm, prepared according to the formula in the Edinburgh Pharmacopœia, contains a grain and a half of opium; and rather more in that prepared by the prescription of the London College, thirty-six grains of the latter containing one grain.

It remains to take notice of those Electuaries or Confections as they are named, which are peculiar to the London Pharmacopœia.

Confectio amygdalæ. Almond Confection.

"Take of Sweet Almonds, an ounce; Gum Arabic in powder, a drachm; Refined Sugar, half an ounce. The almonds having been previously macerated in water, and their external pellicle removed, beat the whole together, until they form an uniform mass." This is introduced as affording an easy and convenient mode of preparing the almond emulsion extemporaneously; a little of this confection forming it by diffusion in water.

Confectio rutæ. Confection of Rue.

"Take of the Dried Leaves of Rue, Carraway Seeds, Bay Berries, of each an ounce and a half; Sagapenum, half an ounce; Black Pepper, two drachms; Clarified Honey, sixteen ounces. Triturate the dry ingredients into a fine powder; then having added the honey, mix them all together."

This is intended merely as the basis of a moderately stimulating enema, sometimes given in the hysteric paroxysm, and in flatulent colic.

Confectio scammoniæ. Confection of Scammony, *Ph. Lond.* (Electuarium Scammonii, *Ph. Dub.*)

"Take of Scammony Powder, an ounce and a half; Cloves, bruised, Ginger-Root in powder, of each six drachms; Oil of Carraway, half a fluid drachm; Syrup of Rose, as much as may be necessary. Triturate the dry substances into a very fine powder; then having added the syrup, rub them again; and, adding the oil of carraway, mix them together." The composition in the Dublin Pharmacopœia is nearly the same, the cloves

being omitted, and their oil added instead of oil of carraway.

This is a stimulating cathartic, not very frequently employed. It is given in a dose of from half a drachm to a drachm.

CHAPTER XXIII.

PILULÆ.—PILLS.

Pills are formed from a mass sufficiently stiff and adhesive to preserve the round form which is given to them. Under this form, such medicines are generally exhibited are as nauseous, either in taste or flavour, and such as operate in a small dose. Few general rules require to be given with regard to their formation. Such of the ingredients as are capable of being reduced to powder, are first triturated to the requisite fineness; those which are of a softer consistence are then added, and if this is not sufficient to bring the whole to a proper consistence, a small quantity of syrup or mucilage is to be added; the former is preferable, as the latter in drying, is liable to render the mass too hard. Some substances, as several of the gum-resins, become soft on beating, so as to form into pills. Light vegetable powders, when beat up with syrup, form a mass which is not sufficiently coherent to roll out. In this case it is necessary to add a small quantity of pure soap, which gives the necessary tenacity. Metallic preparations, which are heavy, and given in a small dose, are made into pills by the addition of some extract or conserve. If the pill mass is too soft, so that the pills, after being formed, do not keep their form, it may be made harder by the addition of a small quantity of any inactive vegetable matter, as powder of liquorice. After they are rolled out, they must, to prevent them from adhering,

be covered with the same powder, or, what is preferable, as less liable to become mouldy, starch or carbonate of magnesia. A pill ought not to exceed five grains in weight, or twelve may be formed from a drachm of the mass. They ought not to be prepared in too large a quantity at a time, as if long kept they become so hard as to be scarcely acted on in the stomach.

Pilulæ Aloeticæ. Aloëtic Pills.

" Take of Socotorine Aloes reduced to powder, Soap, of each equal weights. Beat them with Simple Syrup, so as to make a mass fit for pills."

Pilulæ aloes compositæ. Compound Aloes Pills. Pharm. Lond.

Take of Socotorine Aloes, in powder, one ounce; Extract of Gentian, half an ounce; Oil of Carraway, forty minims; Syrup, as much as necessary. Beat them together until they form a mass."

In this formula the proportion of extract of gentian is too large, the mass being too soft to form properly into pills. It affords a convenient form for the exhibition of aloes, and is in common use as a purgative. Its medium dose is 10 or 15 grains.

Under either of these simple forms aloes is very commonly exhibited as a cathartic. Two pills are a medium dose.

Pilulæ aloes cum zingibere. Pills of Aloes with Ginger Ph. Dub.

" Take of Heptatic Aloes, one ounce; Ginger Root in powder, one drachm; Spanish Soap, half an ounce; Essential Oil of Peppermint, half a drachm. Triturate the aloes with the ginger to powder, add the soap and essential oil, and form the whole into one mass."

This composition is adapted to the same purposes as the preceding pill, the essential oil communicating some aromatic flavour and pungency. Their dose is the same.

PILULÆ ALOES ET ASSAFOETIDÆ. Pills of Aloes and Assafœtida.

"Take of Socotorine Aloes in powder, Assafœtida, Soap, of each equal parts. Beat them into a mass with mucilage of Gum Arabic."

These pills are occasionally employed in amenorrhœa, hysteria, in dyspepsia attended with flatulence, and in tympanitis, two or three being taken at bedtime. They will at least prove useful by obviating costiveness.

PILULÆ ALOES CUM COLOCYNTHIDE. Pills of Aloes with Colocynth.

"Take of Socotorine Aloes, Scammony, of each eight parts; Colocynth, four parts; Sulphate of Potash with Sulphur, Oil of Cloves, of each one part. Let the aloes and scammony be reduced, with the salt to powder, then let the colocynth, rubbed into a fine powder, and the oil, be added. Lastly, beat them with mucilage of Gum Arabic into a mass."

PILULÆ COLOCYNTHIDIS COMPOSITÆ. Compound Colocynth Pills. Ph. Dub.

"Take of Colocynth, half an ounce; Hepatic Aloes, Scammony, of each an ounce; Spanish Soap, two drachms; Oil of Cloves, one drachm. Reduce the aloes, scammony, and colocynth, separately to powder; then beat them together with the oil and soap, with the addition of the syrup into a mass."

These compositions are of similar powers. They afford a stronger cathartic than the simple aloëtic pill, and accordingly this compound pill is used in constipation, or to obviate habitual costiveness. Two pills are a common dose.

PILULÆ ALOES ET MYRRHÆ. Pills of Aloes and Myrrh. (Pilulæ Aloes cum Myrrh. *Ph. Lond. Dub.*)

"Take of Socotorine Aloes, four parts; Myrrh, two parts; Saffron, one part. Beat them into a mass with

Simple Syrup." In the formula of the London College, the proportion of saffron is equal to two parts. In that of the Dublin Pharmacopœia, a little oil of carraway is added.

These pills, under the name of Rufus's Pills, have long been in use, as affording a moderately stimulating cathartic, useful in dyspepsia connected with costiveness; sometimes used also in hypochondriasis, hysteria, and in jaundice. Their dose is ten or fifteen grains.

PILULÆ AMMONIARETI CUPRI. Pills of Ammoniuret of Copper.

"Take of Ammoniuret of Copper, rubbed into fine powder, sixteen grains; Crumb of Bread, four scruples; Water of Carbonate of Ammonia, as much as may be sufficient. Beat them into a mass, which divide into thirty-two equal pills."

It is under this form that ammoniuret of copper is given in epilepsy and the other spasmodic diseases in which it has been employed. Half a grain of it is contained in each pill. One pill is given at first, night and morning, and the dose is gradually increased, as far as the stomach and general system will bear it, until a cure is obtained, or the remedy has received a fair trial.

PILULÆ ASSÆFOETIDÆ COMPOSITÆ. Compound Assafœtida Pills.

"Take of Assafœtida, Galbanum, Myrrh, of each eight parts; Rectified Oil of Amber, one part. Beat them into a mass with Simple Syrup."

These pills afford a stimulating aperient, and fœtid antispasmodic, used in hysteria and amenorrhœa, two or three of them being taken at bedtime.

PILULÆ GALBANI COMPOSITÆ. Compound Pills of Galbanum. Pharm. Lond.

"Take of Galbanum, an ounce; Myrrh, Sagapenum, of each one ounce and a half; Assafœtida, half an ounce; Syrup, as much as may be sufficient. Beat them together, and form a mass."

Pilulæ myrrhæ compositæ. Compound Pills of Myrrh. Ph. Dub.

"Take of Assafœtida, Galbanum, Myrrh, in powder, of each one ounce; Oil of Amber, half a drachm. Triturate them together, and form them into a mass with Symple Syrup."

These compositions, though under different names, are similar to the preceding one. They all form a substitute for the Gum Pills of the older Pharmacopœias. They are used in the same cases, and in the same dose.

Pilulæ hydrargyri. Mercurial Pill. (Pilulæ Hydrargyri, *Ph. Lond. Dub.*)

"Take of Purified Quicksilver, Conserve of Red Rose, of each one ounce; Starch two ounces. Rub the quicksilver with the conserve, in a glass mortar, until the globules entirely disappear, adding, as there may be occasion, a little mucilage of gum Arabic; then add the starch, and beat, with a little water, into a mass, which is to be immediately divided into four hundred and eighty pills." The formula in the London and Dublin Pharmacopœias is a little different from this. It prescribes "of Purified Quicksilver, two drachms; Conserve of Red Rose, three drachms; Liquorice Root in powder, one drachm. Rub the quicksilver with the conserve until the globules no longer appear, then adding the liquorice powder, beat the whole together so as to form a mass." A grain of mercury is contained in four grains of the mass, prepared according to the formula of the Edinburgh College, and in three grains according to the other.

The trituration of the quicksilver in this preparation was formerly believed to reduce it merely to a state of extreme mechanical division. But there is every reason to believe that an oxidation of the metal is effected, and that the medicinal efficacy of the preparation depends on this oxide. Quicksilver, in its metallic state, being entirely inert with regard to the living system, the activity

of the preparation itself is a presumption of this; but it is farther known, that by agitation with atmospheric air, quicksilver affords a portion of a gray powder, soluble in muriatic acid, and which must therefore be regarded as an oxide, metallic quicksilver being insoluble in that acid. This oxidation must be effected more readily when the surface of the metal is extended, and its continuity is divided by the interposition of any viscous matter, and hence the advantage derived from the trituration of it with substances of this kind, in the preparation of the mercurial pill. Different substances have been employed syrup, mucilage, honey and others. The Colleges have now agreed in preferring the Conserve of Rose, it having been supposed that this is superior to the others in facilitating the operation. Much attention is requisite that the trituration be continued until the extension is completed, as on this the efficacy of the pill depends. This is known by rendering the matter a little thinner by the addition of a little water, and extending it by rubbing on a glass plate or on paper, when the globules, if any remain, will be apparent. Starch has been selected by the Edinburgh College to form it into a mass, and is preferable to liquorice powder, as not being liable to become mouldy.

This pill is the preparation of mercury that is upon the whole most generally used for obtaining the general action of this metal on the system; and while it is milder in its operation than some others, and has less determination to the intestinal canal, it is sufficiently active and certain. The common dose, given with the view of inducing the usual mercurial action, is two pills at bedtime and one in the morning, which, in particular cases and habits, requires to be increased. Four or six pills given at once generally excite purging.

Pilulæ opiatæ, *olim Pilulæ Thebaicæ.* Opiate Pills.

"Take of Opium, one part; Extract of Liquorice, seven parts; Jamaica Pepper, two parts. Mix the opium

and the extract separately, softened with diluted alcohol and beat them into a pulp; then add the Jamaica pepper rubbed to powder, and, beating them well, reduce them to a mass."

PILULÆ SAPONIS CUM OPIO. Pills of Soap with Opium. Ph. Lond.

"Take of Hard Opium, rubbed to powder, half an ounce; Hard Soap, two ounces. Beat them together, until they form one mass."

PILULÆ E STYRACE. Pills of Storax. Pharm. Dub.

"Take of Purified Storax, three drachms; Soft Purified Opium, one drachm; Saffron, the same weight. Beat them together, mixing them thoroughly."

The articles which in these compositions are added to the opium, cannot be supposed to have any important effect on its operation; they serve merely to disguise it; and where it is necessary, which it occasionally is, to conceal the administration of opium from the patient, they afford convenient forms. Even the name sometimes requires to be concealed in a prescription; and hence the reason of the names given by the London and Dublin Colleges being derived from the trivial ingredients. It is only to be regretted, that the proportion of Opium is not the same in all of them. Two pills, or ten grains of the pill of the Edinburgh Pharmacopœia, contain one grain of opium; while in the formula of the London and Dublin Colleges, the proportion of opium is larger, five grains or one pill containing one grain.

PILULÆ RHEI COMPOSITÆ. Compound Pills of Rhubarb.

"Take of the Root of Rhubarb, in powder, one ounce; Socotorine Aloes, six drachms; Myrrh, half an ounce; Oil of Peppermint, half a drachm. Beat them into a mass with syrup of orange-peel."

This is a moderate laxative much employed, especially in dyspeptic affections, to obviate costiveness, and

stimulate gently the stomach and intestines. Two pills are taken at bed-time, and operate in general without occasioning any irritation, evacuating the contents of the intestines, without producing purging.

PILULÆ SCILLITICÆ. Squill Pills.

"Take of the dried Root of Squill, rubbed to a fine powder, one scruple; Gum-Ammoniac, Cardamom Seeds, in powder, Extract of Liquorice, of each one drachm. Beat them with simple syrup into a mass."

PILULÆ SCILLÆ COMPOSITÆ. Compound Squill Pills. Ph. Lond.

"Take of the Root of Squill, recently dried, and beat to powder, a drachm; Ginger Root, in powder, Hard Soap, of each three drachms; Gum-Ammoniac in powder, two drachms. Mix the powders together; then beat them with the soap, adding as much syrup as may be sufficient to give the due consistence."

PILULÆ SCILLÆ CUM ZINGIBERE. Pills of Squill with Ginger.

"Take of Squill Root in powder, one drachm; Ginger Root in powder, two drachms; Essential Oil of Anise, ten drops. Triturate them together, and form them into a mass by the addition of soap jelly."

Under the form of these compositions, which have long been officinal, and which do not differ materially from each other, squill is often given as an expectorant in dyspnœa and chronic catarrh, two pills being taken morning and evening. Any efficacy they have depends on the squill. But there appears to be no advantage in reducing so much its activity by the addition of so large a proportion of other matter; and as squill, when long kept, is liable to have its strength impaired, it is perhaps preferable that it should be given under some form of extemporaneous preparation.

There are a few officinal Pills peculiar to the London Pharmacopœia.

Pilulæ Gambogiæ compositæ. Compound Gamboge Pills.

"Take of Gamboge in powder, Socotrine Aloes in powder, Compound Powder of Cinnamon, of each one drachm; Soap, two drachms. Mix the powders together, then, adding the soap, beat the whole into one mass."

By the addition of the gamboge to the aloes, its cathartic power is increased, and a composition afforded, more active than the aloëtic pill. Two or three pills are a dose.

Pilulæ ferri cum myrrha. Pills of Iron with Myrrh.

"Take of Myrrh, beat to powder, two drachms; Sub-carbonate of Soda, Sulphate of Iron, Sugar, of each a drachm. Triturate the myrrh with the sub-carbonate of soda; then having added the sulphate of iron, triturate them again; lastly, beat the whole together, until they form an uniform mass."

This is the same composition, with regard to the active ingredients, as forms the basis of the compound mixture of iron, the substitute for Griffith's mixture, and it may be occasionally convenient to prescribe it under the form of pill, or to form the mixture from it extemporaneously by diffusion in water. The ingredients, however, are not very well adapted to preserve this form.

Pilulæ hydrargyri sub-muriatis. Pills of Sub-muriate of Quicksilver.

"Take of Sub-muriate of Quicksilver, Precipitated Sulphuret of Antimony, of each a drachm; Gum-resin of Guaiac, beat to powder, two drachms. Triturate the sub-muriate of quicksilver with the precipitated sulphuret of antimony, then with the gum-resin of guaiac, and add of copaiba as much as may be sufficient to give the proper consistence.

This composition of Calomel, and what is named Precipitated Sulphuret of Antimony, was introduced by Dr. Plummer as an alterative, employed more particularly in cutaneous affections. The pills, under his name, had a place in the Pharmacopœias, and though expunged, they have been restored by the London College, as occasionally used in practice.

CHAPTER XXIV.

TROCHISCI.—TROCHES.

Troches, or Lozenges, consist of powders mixed with mucilage, in such a proportion, that when dried they are firm and hard. While in the state of a soft paste, they are cut into small square or round tablets, and these are hardened by drying. The form is one adapted principally to such medicines as are designed to dissolve slowly in the mouth; and hence they are always rendered pleasant by the addition of a large proportion of sugar. They are seldom active remedies, but are employed principally in affections of the mouth or throat. As of little importance, they have been rejected in the Dublin and in the late edition of the London Pharmacopœia, and a few only are retained by the Edinburgh College.

Trochisci carbonatis calcis. Troches of Carbonate of Lime.

" Take of Prepared Carbonate of Lime, four ounces; Gum Arabic, one ounce; Nutmeg, one drachm; Refined Sugar, six ounces. Rub these to powder, and make them into a mass with water, fit for forming troches."

This is a pleasant form under which carbonate of lime may be given as an antacid, though the quantity

of saccharine matter may perhaps rather favour the production of acid in the stomach; and either from this, or from not being well prepared in the shops, they are little used.

TROCHISCI GLYCYRRHIZÆ. Liquorice Troches.

"Take of Extract of Liquorice, Gum Arabic, of each one part: Refined Sugar, two parts. Let them be dissolved in warm water, and strained. Then evaporate the solution, with a gentle heat, into a mass, which form into troches."

These, from their demulcent quality, may be used to allay coughing, in catarrh; but the simple extract of liquorice is equally effectual, and when purified by solution in water, and afterwards inspissated so as to be of a firm consistence, forming what is named Refined Liquorice, is more grateful. Hence these troches are never used.

TROSCHISCI GLYCYRRHIZÆ CUM OPIO. Liquorice Troches with Opium.

"Take of Opium, two drachms; Tincture of Tolu Balsam, half an ounce; Simple Syrup, eight ounces: Extract of Liquorice, softened with Warm Water, Gum Arabic, in powder, of each five ounces. First rub the opium thoroughly with the tincture; then add gradually the syrup and the extract; afterwards sprinkle in the powder of gum Arabic; and, lastly, dry the mass, that it may be formed into troches, each weighing ten grains."

These are the most active troches in the Pharmacopœia, and are very effectual in relieving the tickling cough frequently attending catarrh. The opium is the ingredient on which their efficacy principally depends, its local operation lessening the irritation which gives rise to coughing: the others cover its taste and flavour, and render the composition pleasant, adding at the same time a demulcent quality. One drachm, or six troches, contain one grain of opium; and from six to twelve may

be taken in twenty-four hours. The composition would be improved, if the proportion of opium were diminished, as they would then be less ungrateful; their action would be more gradual, and a greater number could be easily taken. A substitute might be found too for the balsam of Tolu, the flavour of which is rather unpleasant, and which cannot be supposed to communicate any virtue.

TROCHISCI GUMMOSI. Gum Troches.

"Take of Gum Arabic, four parts; Starch, one part; Refined Sugar, twelve parts. These being rubbed to powder, are to be formed into a mass, with rose water, fit for forming troches."

This composition is designed as a demulcent, but is never used; it is not very pleasant, and gum Arabic, when pure, answers the same purpose equally well.

TROCHISCI NITRATIS POTASSÆ. Troches of Nitrate of Potash.

"Take of Nitrate of Potash, one part; Refined Sugar, three parts. Beat them to powder, and, with mucilage of gum tragacanth, make them into a mass proper for forming troches."

Under this form, nitrate of potash is sometimes used as a refrigerant in angina tonsillaris, and to allay the sense of heat attending salivation, and abate the inflammation, being allowed to dissolve slowly in the mouth. They do not very well retain their form, being liable to become humid, and a mixture of nitre and sugar in powder answers equally well.

CHAPTER XXV.

LINIMENTA UNGUENTA ET CERATA—LINIMENTS, OINTMENTS, AND CERATES.

These are compositions of a soft consistence, having some unctuous substance for their basis, such as oil, lard, spermaceti, or wax. When the consistence is so soft as to be thick, but nearly fluid, it is termed a Liniment; when it is more firm, it is an Ointment; and when still harder it forms a Cerate. It is evident that these different degrees of consistence depend on the proportions of the ingredients. Where the oil is in large quantity, a liniment is formed, and the addition to this of a larger proportion of wax forms an ointment or cerate. The following general directions are given in the Edinburgh Pharmacopœia for their preparation. "In making these compositions, fatty and resinous substances are to be melted with a gentle heat, stirring them constantly, sprinkling in at the same time the dry ingredients, if there are any, reduced to a very fine powder, until the mixture, by cooling, become firm." In general it is better to melt them by the heat of a water bath, than by the direct application of fire to the vessel.

Formerly ointments were numerous and complicated in their composition, and surgeons adapted, with much formality, different ointments to answer different indications. The practice is now more simple; the principal intention in these applications is to keep the parts soft and easy, and to exclude the atmospheric air, and therefore the simplest composition that is of a proper consistence and tenacity answers the purpose. It is only in a few cases that certain substances are added to these simple compositions, with the view of obtaining peculiar effects from their stimulant, or sometimes their spe-

cific operation, or from their chemical action. The consistence of a cerate is usually the most convenient, at least for continued application, that of an ointment being rather too thin, especially when it is rendered thinner by the heat of the part to which it is applied.

LINIMENTUM AQUÆ CALCIS, *sive Oleum Lini cum Calce.* Liniment of Lime Water, or Oil of Lintseed with Lime. (Linimentum Calcis, *Ph. Dub.*)

"Take of Oil of Lintseed, Lime Water, of each equal parts. Mix them."

This is a saponaceous compound, formed by the mutual chemical action of the lime-water and oil. It is a thick bland fluid of a white colour, and is sometimes used as a soothing application to inflamed parts; more particularly to burns, being spread over the surface with a feather. It requires to be extemporaneously prepared, as after a little time the soapy matter separates from the water.

LINIMENTUM SIMPLEX. Simple Liniment.

"Take of Olive Oil, four parts; White Wax, one part."

UNGUENTUM SIMPLEX. Simple Ointment.

"Take of Olive Oil, five parts; White Wax, two parts."

CERATUM SIMPLEX. Simple Cerate.

"Take of Olive Oil, six parts; White Wax, three parts; Spermaceti, one part."

These compositions differ merely in consistence. They are applied, spread on linen, as usual dressings to slight wounds and excoriations. The cerate affords the composition, which, from consistence, is best, adapted to this The following compositions in the London and Dublin Pharmacopœias, are nearly the same, and are designed for the same purposes.

UNGUENTUM CETACEI, Ph. Lond.

UNGUENTUM SPERMATIS CETI, Ph. Dub. Spermaceti Ointment.

The former consists of Spermaceti, six drachms; White Wax, two drachms; Olive Oil, three fluid ounces: the latter, of White Wax, half a pound; Spermaceti, one pound; Prepared Lard, three pounds.

CERATUM CETACEI, Spermaceti Cerate, Ph. Lond. —is composed of half an ounce of Spermaceti; two ounces of White Wax; and four fluid ounces of Olive Oil; and hence differs merely in consistence.

CERATUM, Cerate. Ph. Lond —This consists of four ounces of Yellow Wax; and four fluid ounces of Olive Oil.

UNGUENTUM CERÆ FLAVÆ, Ointment of Yellow Wax, Ph. Dub.—is formed from one pound of Purified Yellow Wax, and four pounds of Prepared Lard.

UNGUENTUM CERÆ ALBÆ, Ointment of White Wax, Ph. Dub.—is the same composition with the substitution, of White for Yellow Wax.

UNGUENTUM RESINOSUM Resinous Ointment. (Unguentum Resinæ, Albæ, *Ph. Dub.*—Ceratum Resinæ, *Ph. Lond.*)

"Take of Hogs Lard, eight parts; White Resin, five parts; Yellow Wax, two parts." In the London Pharmacopœia, a pound of resin and a pound of wax are melted with a pint of olive oil.

The addition of the resin renders this considerably more stimulating than the preceding ointments. Hence it is used as a dressing where the object is to promote suppuration.

Unguentum pulveris meloes vesicatorii, *olim Unguentum Epispasticum fortius.* Ointment of the Powder of Cantharides. (Unguentum Cantharidis, *Ph. Dub.*—Ceratum Lyttæ, *Ph. Lond.*)

"Take of Resinous Ointment, seven parts; Powder of Cantharides, one part."

This is the ointment commonly employed to establish a purulent discharge, or form a superficial issue in the part to which a blister has been applied; this it does from the acrid and stimulating quality of the cantharides, which quickly changes the serous discharge from the blister into one of a purulent nature, and by continuing the application, this may be kept up for any length of time. In preparing it, the cantharides ought to be reduced to a very fine powder.

Unguentum infusi meloes vesicatorii, *olim Unguentum Epispasticum mitius.* Ointment of Infusion of Cantharides.

"Take of Cantharides, White Resin, Yellow Wax, of each one part; Venice Turpentine, Hogs Lard, of each two parts; Boiling Water, four parts. Macerate the cantharides in the water for a night, and strain the liquor, pressing it strongly; having added the lard, boil it until the water is evaporated; then add the wax and resin. These being melted and removed from the fire, add the turpentine."

The ointment with the powder of cantharides sometimes occasions too much pain and irritation. The composition obtained by this process is designed as a milder application, adapted in such cases to answer the same indication. The water, by infusion on the cantharides, extracts the acrid matter, but this, from being in a state of solution, is, after the subsequent evaporation, diffused through the unctuous matter in a state of finer division than the powder can be. It is also from the proportions ordered, in smaller quantity, but its stimulating quality is aided by the turpentine, and it is still sufficiently so to keep up the purulent discharge.

UNGUENTUM SUB-ACETITIS CUPRI, *olim Unguentum Æruginis.* Ointment of Sub-Acetite of Copper, *or* Verdigris. (Unguentum Æruginis, *Ph. Dub.*)

"Take of Resinous Ointment, fifteen parts; Sub-Acetite of Copper, one part."

This ointment is used as a stimulant and escharotic, applied to foul ulcers. It is rather too active, and in general requires to be mixed with an additional proportion of resinous or simple ointment; nor is it used but as an occasional dressing.

UNGUENTUM HYDRARGYRI, *vulgo Unguentum Cœruleum.* Ointment of Quicksilver.

"Take of Quicksilver, Mutton Suet, of each one part; Hogs Lard, three parts. Rub the quicksilver thoroughly in a mortar with a little of the lard, until the globules disappear; then add the remaining fats. It may be made also with a double or triple proportion of quicksilver."

UNGUENTUM HYDRARGYRI FORTIUS. Stronger Ointment of Quicksilver. Ph. Lond.—(Unguentum Hydrargyri, *Ph. Dub.*)

"Take of Purified Quicksilver, two pounds; Prepared Hogs Lard, twenty-three ounces; Prepared Tallow, one ounce. Rub first the quicksilver with the tallow and a litle lard, until the globules disappear; then add the remaining lard, and mix them." In the Dublin Pharmacopœia, equal weights of quicksilver and lard are directed to be rubbed together, until the globules are no longer visible.

UNGUENTUM HYDRARGYRI MITIUS. Milder Ointment of Quicksilver. *Ph. Lond. Dub.*

"Take of the Stronger Ointment of Quicksilver, one part; Prepared Hogs Lard, two parts. Mix them." The ointment under the same name in the Dublin Pharmacopœia is ordered to be prepared in the same manner

as the stronger ointment, using a proportion of lard, double that of the quicksilver.

Of these ointments, the one always employed for mercurial friction is that formed from equal weights of quicksilver and lard. The only use of the lard is to faciliate the extinction, as it is called, of the quicksilver, and the introduction of it through the cuticle: these purposes are perfectly attained from this proportion, and any larger quantity of unctuous matter merely weakens it, and renders it necessary to continue the friction longer. The proportion of one part of quicksilver to four of unctuous matter, ordered in the Edinburgh Pharmacopœia, gives an ointment weaker than any that is ever used or kept in the shops. The ointments of the strength ordered in the other Pharmacopœias are those in common use.

This, like other mercurial preparations obtained by trituration, was at one time regarded as deriving its efficacy from the mere mechanical division of the metal. The reasons have been already stated for believing, that in all these preparations the mercury is oxidated, and that their action on the living system depends on this oxide. There are even additional grounds for admitting this conclusion with regard to mercurial ointment. Unctuous matter appears in general to promote the oxidation of metals by the action of the air as is exemplified in the green crust which copper speedily acquires when coated thinly with grease: quicksilver being in a fluid state, and the surface being extended and renewed, by the trituration, these circumstances are still more favourable to the same change being affected more speedily. The improvement of the ointment from keeping affords a similar presumptive proof. The ointment is, when newly prepared, of a light bluish gray colour, but when kept for some time it becomes of a much darker colour, probably from the oxidation of the metal becoming more complete; and it has accordingly been found, that from ointment long prepared, less metallic quicksilver subsides, when it is kept liquid by the heat of a water

bath, than from ointment newly prepared. Even from the latter, only part of the quicksilver subsides in globules; the remaining quantity is in the state of a gray powder, which there is every reason to conclude, is the gray oxide of the metal.

It has even been supposed, that the quicksilver in the preparation may suffer a farther change. Unctuous matter, and more especially that of animal origin, is known to become rancid from the action of the air, and this rancidity appears to be connected with the formation of an acid, probably the acid produced from fat, the Sebacic. This change may take place to a certain extent during the trituration, and still more when the ointment is long kept, and may promote the oxidation of the mercury, while any acid that is formed may combine with the oxide. According to this view, mercurial ointment will consist of unctuous matter, in which is diffused oxide and sebate of mercury, with a portion generally of metallic mercury, its activity, of course, depending on the former.

The extinction of the mercurial globules by trituration being rather a laborious process, several expedients have been contrived to facilitate it. Several of these are inadmissible, such as the use of sulphur or turpentine. In the ointment prepared with the former, the mercury is probably not in an active state; it is known by its deep black colour, and by the smell of sulphur exhaled when paper covered with it is kindled. Turpentine renders the ointment too acrid, so that when applied by friction it produces irritation on the skin or inflammation; it also can be detected by the odour exhaled in burning. Rancid fat, it has been found, extinguishes the quicksilver better than recent fat, and may be allowed, as by the action of the metal the rancidity of the fat appears to be corrected. The trituration should always be made at first with a little tallow, as lard does not oppose sufficient resistance to afford all the assistance that may be derived from the interposed matter, in facilitating the mechanical division.

Mercurial ointment is the form under which mercury is introduced into the system by external friction. It is a mode employed with advantage in cases where the preparations administered internally are liable to be too much determined to the intestines, so as to occasion griping or purging, or when it is necessary to introduce a large quantity of mercury speedily into the system; the general mercurial action being thus soon induced. It is likewise sometimes employed in some local affections, particularly bubo. One drachm of the strong ointment (that containing equal parts of mercury and lard) is introduced by friction on the skin in the evening, and frequently also in the morning, until the system is affected, the part on which the ointment is rubbed being occasionally changed to avoid irritation or inflammation. The weaker ointments ought not to be employed, as they merely give unnecessary trouble, by the necessity of rubbing in so much lard.

Unguentum oxidi hydrargyri cinerei. Ointment of Gray Oxide of Quicksilver.

"Take of Gray Oxide of Quicksilver, one part; Hogs Lard, three parts."

This is designed as a substitute for the mercurial ointment, and, as the quicksilver is fully oxidated, it has been supposed that it will prove more active and certain. It probably would have this advantage; but it has been said, that it is not easily introduced by friction, the unctuous matter passing through the cuticle without the whole of the oxide,—a difference which if it do exist, must depend on the combination being less intimate.

Unguentum oxidi hydrargyri rubri. Ointment of Red Oxide of Quicksilver. (Unguentum Hydrargyri Nitrico-Oxydi, *Ph. Lond.*—Unguentum Sub-nitratis Hydrargyri, *Ph. Dub.*)

"Take of Red Oxide of Quicksilver by Nitric Acid, one part; Hogs Lard, eight parts."

This is applied as a mild escharotic to remove the diseased surface of ulcers, and as a stimulant to promote suppuration; and in cases of languid ulceration and chronic inflammation is often used with much advantage. Care ought to be taken in its preparation, that the mercurial preparation is reduced to a very fine powder. It ought also to be prepared only when it is to be used, or at least ought not to be long kept, as the mercurial oxide or rather sub-nitrate soon undergoes decomposition, which is indicated by the colour changing from a bright red to a gray.

UNGUENTUM NITRATIS HYDRARGYRI FORTIUS, *vulgo Unguentum Citrinum.* Stronger Ointment of Nitrate of Quicksilver. (Unguentum Hydrargyri Nitratis, *Ph. Lond.*—Unguentum Super-nitratis Hydrargyri, *Ph. Dub.*)

"Take of Purified Quicksilver, one part; Nitrous Acid, two parts; Olive Oil, nine parts; Hogs Lard, three parts. Dissolve the quicksilver in the acid; then beat up the solution strongly with the lard and oil previously melted together, and beginning to cool, in a glass mortar, so as to form an ointment."

In this ointment the nitrate of quicksilver is combined with the lard; and as there is also an excess of nitric acid, it acts chemically on the fact, and, notwithstanding the quantity of oil used, gives to the composition a firm consistence. It forms a very excellent application in various forms of chronic inflammation, such, for example, as psorophthalmia, and in different kinds of cutaneous eruption, herpetic, or connected with superficial inflammation or ulceration. It is either rubbed gently on the part affected, or where this would produce irritation, it is applied, softened by heat, by a hair pencil.

UNGUENTUM NITRATIS HYDRARGYRI MITIUS. Milder Ointment of Nitrate of Quicksilver.

"This is made in the same manner as the preceding, with a triple proportion of lard and oil."

This is designed to afford an application milder than the former, and also of a softer consistence; but, to obtain the latter convenience, it is better to reduce the strong ointment with the requisite proportion of lard, when it is to be used, as, from the operation of the acid, the milder ointment, even with the increased proportion of unctuous matter, is nearly equally firm as the stronger ointment.

UNGUENTUM ACIDI NITROSI. Ointment of Nitrous Acid. (Unguentum Acidi Nitrosi, *Ph. Dub.*)

"Take of Hogs Lard, one pound; Nitrous Acid, six drachms. Mix the acid gradually with the melted lard, and beat the mixture thoroughly while it cools."

In this preparation part of the acid is decomposed, and part of it is combined with the lard. It is designed as an application in cutaneous affections, and has been said to be similar in its effects to the preceding ointment. It appears, however, considerably inferior in efficacy, and since its first introduction it has been little used.

UNGUENTUM OXIDI PLUMBI ALBI. Ointment of White Oxide of Lead. (Unguentum Cerussæ sive Sub-acetatis Plumbi, *Ph. Dub.*)

"Take of Simple Ointment, five parts; White Oxide of Lead, one part."

This has been used principally as an application to burns and superficial inflammation.

UNGUENTUM ACETITIS PLUMBI, *vulgo Unguentum Saturninum.* Ointment of Acetite of Lead. (Ceratum Plumbi Super-acetatis, *Ph. Lond.*—Unguentum Acetatis Plumbi, *Ph. Dub.*)

"Take of Simple Ointment, twenty parts; Acetite of Lead, one part."

The preparations of lead have been supposed to possess a specific power in abating inflammation by local application. They are usually applied under the form of solution; but where that of ointment is preferred, this

composition has been considered as preferable to any other, as containing the most active preparation of lead. It is accordingly often used as a dressing to inflamed parts.

Ceratum plumbi compositum. Compound Cerate of Lead. Ph. Lond.

"Take of Solution of Acetate of Lead, two fluid ounces and a half; Yellow Wax, four ounces; Olive Oil, nine ounces; Camphor, half a drachm. Mix the wax melted, with eight fluid ounces of the oil, then remove the mixture from the fire, and as soon as it begins to become thick, add gradually the solution of acetate of lead, and stir them constantly with a wooden spatula. Lastly, mix with these the camphor dissolved in the remaining oil."

A composition similar to this was introduced by Goulard, as a form of applying lead in ointment. It has been known by the name of Goulard's Cerate, and has been supposed preferable to the preceding ointment It may derive some slight advantage as a soothing application to inflamed parts, from its soft consistence, and from the acetate of lead being diffused through it in a dissolved state.

Ceratum carbonatis zinci impuri, *olim Ceratum Lapidis Calaminaris.* Cerate of Impure Carbonate of Zinc. (Ceratum Calaminæ, *Ph. Lond.*—Unguentum Calaminaris, *Ph. Dub.*)

"Take of Simple Cerate, five parts; Prepared Impure Carbonate of Zinc, one part."

This is the common healing cerate, Turner's Cerate as it has been named, which has long been used as a dressing to slight wounds, excoriations, and ulcers. It appears to act simply by excluding the air and keeping the surface to which it is applied soft; but it is preferable to the composition of wax and oil alone, from the levigated calamine giving a degree of consistence, which is not altered by the heat of the body.

UNGUENTUM OXIDI ZINCI IMPURI, *olim Unguentum Tutiæ.* Tutia Ointment. (Unguentum Tutiæ, *Ph. Dub*)

"Take of Simple Liniment, five parts; Prepared Impure Oxide of Zinc, one part."

This has been used principally as an application in chronic ophthalmia, but it appears to have no particular virtue.

UNGUENTUM OXIDI ZINCI Ointment of Oxide of Zinc. (Unguentum Zinci, *Ph. Lond.*—Unguentum Oxidi Zinci, *Ph. Dub.*)

"Take of Simple Liniment, six parts; Oxide of Zinc, one part."

This was introduced as a substitute for the calamine cerate, oxide of zinc being supposed a purer substance than the calamine stone. Calamine, however, acts merely mechanically in the composition, and there is no advantage in the substitution of the more expensive oxide; hence this ointment is seldom used. Sometimes it has been applied in ophthalmia.

UNGUENTUM PICIS. Ointment of Tar. (Unguentum Picis Liquidæ, *Ph. Lond. Dub.*)

"Take of Tar, five parts; Yellow Wax, two parts." In the London and Dublin Pharmacopœias the composition is equal weights of Tar and Tallow melted together.

This stimulating ointment is sometimes applied to foul ulcers, and has been used with advantage in tinea capitis.

UNGUENTUM PICIS ARIDÆ. Pitch Ointment. Ph. Lond.

"Take of Pitch, Yellow Wax, Yellow Resin, of each nine ounces; Olive Oil, a pint. Melt them together, and strain through linen."

This is applied to the same purposes as the preceding ointment, from which it differs a little in consistence, and in its smell being less strong.

UNGUENTUM SULPHURIS. Ointment of Sulphur. (Unguentum Sulphuris, *Ph. Lond. Dub.*)

"Take of Hogs Lard, four parts; Sublimed Sulphur, one part. To each pound of this ointment, add of Essential Oil of Lemon, or Essential Oil of Lavender, half a drachm." The essential oil, which is designed merely to cover the unpleasant smell of the sulphur, is not ordered in the London or Dublin Pharmacopœia.

Sulphur is applied under this form as a remedy in psora, the surface affected with the eruption being rubbed with the ointment.

UNGUENTUM SULPHURIS COMPOSITUM. Compound Sulphur Ointment. Ph. Lond.

"Take of Sublimed Sulphur, half a pound; Root of White Hellebore, in powder, two ounces; Nitrate of Potash, a drachm; Soft Soap, half a pound; Prepared Lard, a pound and a half."

White hellebore root has been employed with advantage in psora, and this compound ointment may perhaps prove successful in cases where the simple sulphur ointment might be more slow in its operation, or fail.

UNGUENTUM ELEMI COMPOSITUM. Compound Ointment of Elemi. Ph. Lond.

"Take of Elemi, one pound; Common Turpentine, ten ounces; Prepared Suet, two pounds; Olive Oil, two fluid ounces. Melt the elemi with the suet, and having removed them from the fire, mix them immediately with the turpentine and oil; then strain through linen."

This ointment is moderately stimulating, somewhat similar to the resinous ointment, and is applied to the same purpose, that of exciting suppuration from an ulcer. There is a similar composition in the Dublin

Pharmacopœia, under the name of Unguentum Elemi, in which a pound of Elemi, half a pound of Wax, and four pounds of Lard are melted together.

UNGUENTUM SAMBUCI. Ointment of Elder. *Ph. Lond.* (Unguentum Sambuci, *Ph. Dub.*)

"Take of the Flowers of Elder, Prepared Lard, of each two pounds. Boil the flowers of elder with the lard until they become friable; then strain through linen."

The elder flowers communicate to the unctuous matter a rich green colour. Ointments and plasters thus coloured by different herbs were formerly in use, but they have been properly discarded as possessed of no useful quality, and as the easier mode of giving them a colour, by the addition of some green pigment, came to be substituted in the shops for that of boiling the unctuous matter with the fresh vegetable.

UNGUENTUM VERATRI. Ointment of White Hellebore. *Ph. Lond.* (Unguentum Hellebori Albi, *Ph. Dub.*)

"Take of White Hellebore, rubbed to powder, two ounces; prepared Hogs Lard, eight ounces; Oil of Lemon, twenty minims. Mix them." In the composition of the Dublin Pharmacopœia the oil is omitted, and the proportion of hellebore is only three ounces to a pound of lard.

Hellebore is used, under this form, as an application to psora. It proves sometimes effectual, and is less disagreeable than the application of the sulphur ointment.

UNGUENTUM HYDRARGYRI PRÆCIPITATI ALBI. Ointment of White Precipitate of Mercury. *Ph. Lond.* (Unguentum Sub-Muriatis Hydrargyri Ammoniati, *Ph. Dub.*)

"Take of White Precipitate of Mercury, a drachm; Prepared Lard, an ounce and a half. To the lard melted with a gentle heat, add the precipitate of mercury, and mix them."

This is sometimes used as a very mild escharotic, and as a remedy in some cutaneous eruptions.

CERATUM SAPONIS. Cerate of Soap. Ph. Lond.

"Take of Hard Soap, eight ounces; Yellow Wax, ten ounces; Semi-vitrified Oxide of Lead in powder, one pound; Olive Oil, one pint; Vinegar, one gallon. Boil the vinegar with the oxide of lead on a slow fire, stirring constantly until they unite together; then add the soap, and again boil in a similar manner until the water is entirely dissipated: lastly, mix with these the wax previously melted with the oil; then mix with it the other ingredients, so as to form a cerate."

This composition must derive any efficacy it has, principally from the acetate of lead, formed by the boiling of the vinegar on the litharge, and it appears to be an operose process to obtain a composition which has no very particular advantage.

CERATUM SABINÆ. Cerate of Savine. *Ph. Lond.* (Unguentum Sabinæ, *Ph. Dub.*)

"Take of the Fresh Leaves of Savine, bruised, one pound; Yellow Wax, half a pound; Prepared Lard, two pounds. Boil the leaves of the savine with the lard and wax melted together; then strain through linen." In the Dublin Pharmacopœia, only half a pound of savine is ordered to the above proportion of wine and wax.

This ointment is designed as a substitute for the cantharides ointment, as an application to excite suppuration, and continue a purulent discharge, which it is said to do without producing pain or irritation, consequences that occasionally result from the common issue ointment. It is also sometimes used, prepared from the leaves of savine, reduced to fine powder, and mixed with lard.

UNGUENTUM PIPERIS NIGRI. Ointment of Black Pepper. Ph. Dub.

"Take of Prepared Lard, one pound; Black Pepper, rubbed to powder, four ounces. Form them into an ointment."

This must form a very stimulating ointment. For what purpose it is designed is not very obvious.

LINIMENTUM HYDRARGYRI. Liniment of Quicksilver. Ph. Lond.

"Take of the Strong Mercurial Ointment, Prepared Lard, of each four ounces; Camphor, one ounce; Rectified Spirit, fifteen minims; Water of Ammonia, four fluid ounces. Rub the camphor first with the spirit, then with the lard and mercurial ointment; lastly, adding gradually the water of ammonia, mix the whole together."

This is designed as a stimulating application and discutient, to be applied to indolent tumours or collections of fluid; by its stimulant action it may promote absorption, and the mercury introduced by the friction may exert a more permanent action.

LINIMENTUM TEREBINTHINÆ. Turpentine Liniment.

"Take of the Resin Cerate, a pound; Oil of Turpentine, half a pint. To the melted cerate add the oil of turpentine, and mix them together."

Oil of turpentine has been found to be a successful application to burns, and this liniment is a form under which it has been used.

CHAPTER XXVI.

EMPLASTRA.—PLASTERS.

Plasters are of similar composition to ointments, but differ from them in their much firmer consistence, which is such, that they do not adhere to the hand. They owe this consistence, in general, to a larger proportion of wax, or sometimes to the addition of certain metallic oxides, particularly those of lead, which unite chemically with the unctuous matter. They require, in general, to be heated, in order to be spread: hence they adhere more firmly, and several of them even afford a mechanical support. They are employed generally to answer the same indications as ointments. The same rules are to be observed in their preparation, as in that of Ointments.

Emplastrum simplex, *olim Emplastrum Cereum.* Simple Plaster. (Emplastrum Ceræ, *Ph. Lond.*)

"Take of Yellow Wax, three parts; Mutton Suet, Resin, of each two parts."

The principal use of this plaster is as a dressing to the part to which a blister has been applied, after the vesicle has been cut. It is spread thin on linen with a hot iron.

Emplastrum oxidi plumbi semi-vitrei, *olim Emplastrum Commune.* (Emplastrum Plumbi, *Ph. Lond.*—Emplastrum Lithargyri, *Ph. Dub.*)

"Take of the Semi-vitreous Oxide of Lead, one part; Olive Oil, two parts. Having added water, boil them, stirring constantly, until the oil and the oxide unite into a plaster."

This, which has been long known by the name of

Diachylon, is a chemical combination of the expressed oil with the oxide of lead, and is of a consistence sufficiently hard to form a plaster. There is considerable attention requisite in preparing it, particularly in stirring it constantly to promote the combination, and allow of the escape of the watery vapour. The use of the water is to prevent the heat from rising too high, and if the quantity is dissipated before the combination is complete, an additional portion must be added, taking care to add it hot. The plaster is used, spread on leather or linen, as an application to excoriations or slight wounds.

EMPLASTRUM RESINOSUM, *olim Emplastrum Adhæsivum.* Resinous Plaster. (Emplastrum Resinæ, *Ph. Lond.*—Emplastrum Lithargyri cum Resina, *Ph. Dub.*)

"Take of Plaster of Semi-vitreous Oxide of Lead, five parts; Resin, one part."

The plaster of litharge is rendered more adhesive, and somewhat more stimulating by this intermixture of resin. It is applied to similar uses.

EMPLASTRUM OXIDI FERRI RUBRI, *olim Emplastrum Roborans.*

"Take of Plaster of Semi-vitreous Oxide of Lead, twenty-four parts; Resin, six parts; Yellow Wax, Olive Oil, of each three parts; Red Oxide of Iron, eight parts. Rub the red oxide of iron with the oil, and add it to the other ingredients melted." There is a similar composition in the Dublin Pharmacopœia, under the name of EMPLASTRUM THURIS, in which two pounds of litharge plaster, and half a pound of frankincense, are melted together, and three ounces of red oxide of iron added.

These plasters, spread on leather, are sometimes used as an application in slight cases of lumbago, and give some relief, merely by affording a mechanical support.

EMPLASTRUM ASSÆFOETIDÆ. Assafœtida Plaster.

"Take of Plaster of Semi-vitreous Oxide of Lead,

Assafœtida, of each two parts; Galbanum, Yellow Wax, of each one part."

This plaster is sometimes applied to the breast or side, as a remedy in hysteric affections, but probably with little advantage.

EMPLASTRUM GUMMOSUM. Gum Plaster.

"Take of Plaster of Semi-vitreous Oxide of Lead, eight parts; Gum Resin of Ammoniac, Galbanum, Yellow Wax, of each one part."

EMPLASTRUM GALBANI. Galbanum Plaster. Ph. Dub.

"Take of the Plaster of Litharge, two pounds; Galbanum, half a pound; Yellow Wax, four ounces. To the galbanum melted with a gentle heat, add the litharge, plaster and wax, and melt them with a moderate heat."

EMPLASTRUM GALBANI COMPOSITUM. Compound Galbanum Plaster. Ph. Lond

"Take of Galbanum purified, eight ounces; Plaster of Lead, three pounds; Common Turpentine, ten drachms; Frankincense bruised, three ounces. To the galbanum and turpentine previously melted together, add first the frankincense, then the plaster of lead, melted with a slow fire, and mix them."

These three plasters are essentially the same. They are employed as discutient applications to indolent tumors, and sometimes to promote suppuration.

EMPLASTRUM HYDRARGYRI. Quicksilver Plaster. (Emplastrum Hydrargyri, *Ph Lond.*

"Take of Olive Oil, Resin, of each one part; Quicksilver, three parts; Plaster of Semi-vitreous Oxide of Lead, six parts. Rub the quicksilver with the oil and resin melted together, and then cooled until the globules disappear; then add gradually, the plaster of semi-vitre-

ous oxide of lead, melted, and mix the whole carefully." The composition in the London Pharmacopœia is somewhat different. It consists of "Purified Quicksilver, three ounces; Sulphurated Oil, half a drachm; Plaster of Lead, a pound. Rub the quicksilver with the sulphurated oil until the globules disappear, then add gradually the plaster of lead, melted, and mix them." The sulphurated oil causes the mercury to lose the form of globules more quickly, and therefore abridges the labour of the preparation; but it may be doubted if the quicksilver thus extinguished is in the same state of activity as when this has been done by trituration with unctuous matter alone.

The mercurial plaster is applied as a discutient to indolent tumours; and it has been supposed, that from its continued application, the mercury will be absorbed, and act locally, particularly in glandular affections.

Emplastrum saponaceum. Soap Plaster. (Emplastrum Saponis, *Ph Lond. Dub.*)

"Take of Plaster of semi-vitreous oxide of Lead, four parts; Gum Plaster, two parts; Soap sliced, one part. Mix the soap with the plasters melted together; then boil a little, so as to form a plaster." In the London and Dublin Pharmacopœias, the plaster is formed from litharge plaster and soap alone.

This has been supposed to possess a discutient quality; but it is much inferior to the mercurial plaster, and is scarcely ever used.

Emplastrum meloes vesicatorii, *olim Emplastrum Vesicatorium.* Plaster of Cantharides. (Emplastrum Cantharidis, *Ph. Dub.*—Emplastrum Lyttæ, *Ph. Lond.*)

"Take of Mutton Suet, Yellow Wax, Resin, Cantharides, of each equal weights. Mix the cantharides, rubbed into a fine powder, with the other ingredients, melted together and removed from the fire."

This is the plaster usually employed to raise a blister,

an effect produced from the action of the acrid matter of the cantharides. It is of a softer consistence than the other plasters, that it may admit of being spread without the assistance of heat, which would impair the acrid quality. It is spread on leather, and requires to be applied twelve hours to produce a perfect blister: it is then removed; the vesicle is cut, and the inflamed surface dressed with simple cerate or plaster. In cases where it is of importance that a blister should be raised with certainty, and speedily, it is of advantage to sprinkle a little of the powder of cantharides on the surface of the plaster when spread. Washing the part previously with vinegar, is also useful to insure the effect. Camphor is sometimes mixed with the blistering composition, on the supposition that it prevents the strangury, which is sometimes produced by a large blister; but it appears to have no such virtue, and this painful symptom is more effectually obviated by the free use of diluents while the blister is applied,—a practice always proper where the system is irritable, or even in common cases where the blister is large.

Emplastrum meloes vesicatorii compositum. Compound Plaster of Cantharides.

"Take of Venice Turpentine, eighteen parts; Burgundy Pitch, Cantharides, of each twelve parts; Yellow Wax, four parts; Sub-acetite of Copper, two parts; Mustard Seed, Black Pepper, of each one part. To the Burgundy pitch and wax melted, add the turpentine. While these are melted and still warm, add the other ingredients mixed and rubbed to a fine powder, stirring constantly, so as to form a plaster."

It occasionally happens, that the common plaster of cantharides is insufficient to excite a blister, even when its surface has been sprinkled over with powdered cantharides. In such cases, or even in others where it is necessary that a blister should be quickly raised, and where the system is not easily affected, as in comatose diseases, this more powerful composition may be em-

ployed. Its operation is accompanied with a very pungent sensation of heat. The application of it ought not to be continued too long, as it might induce ulceration; and the precaution of the patient drinking freely of any mild diluent while it is applied, ought also to be attended to.

EMPLASTRUM AMMONIACI. Ammoniac Plaster. Ph. Lond.

"Take of Gum-Resin of Ammoniac, purified, five ounces; Acetic Acid, half a pint. Dissolve the ammoniac in the vinegar; then evaporate the liquor in an iron vessel by the heat of a water-bath, stirring it constantly until it attain a proper consistence."

Under this form, gum-ammoniac is applied as a discutient, and sometimes also as a remedy in tinea capitis; and as it is occasionally used, the London College have received it as an officinal preparation.

EMPLASTRUM AMMONIACI CUM HYDRARGYRO. Plaster of Ammoniac with Quicksilver. *Pharm, Lond. Dub.*

"Take of Purified Ammoniac, one pound; Purified Quicksilver, three ounces; Sulphurated Oil, one fluid drachm. Rub the quicksilver with the sulphurated oil until the globules disappear; then add gradually the ammoniac melted, and mix them."

This is similar to the simple mercurial plaster, its discutient and stimulant powers being perhaps somewhat promoted by the ammoniac. It is applied to the same purposes.

EMPLASTRUM CUMINI. Cumin Plaster Ph. Lond.

"Take of Cumin Seeds, Carraway Seeds, Bay Berries, of each three ounces; Burgundy Pitch, three pounds; Yellow Wax, three ounces. To the pitch and wax melted, add the other ingredients rubbed to powder, and mix them."

This has been applied to the region of the stomach as a moderate stimulant in hysteric affections and flatulent colic, but it cannot be supposed to be of any advantage.

EMPLASTRUM OPII. Opium Plaster, Ph. Lond.

"Take of Hard Opium in powder, half an ounce; Frankincense bruised, three ounces; Plaster of Lead, a pound. To the plaster melted, add the frankincense and opium, and mix them."

Opium has sometimes been used as an anodyne, by external application, with advantage, as, for example, in relieving the pain of tooth-ach. This plaster, newly introduced into the London Pharmacopœia, is designed to afford a form of applying it, though the more usual mode of extending a piece of opium softened between the fingers on leather or silk is probably to be preferred, as even more effectual.

EMPLASTRUM PICIS COMPOSITUM. Compound Pitch Plaster. Pharm. Lond.

"Take of Burgundy Pitch, two pounds; Frankincense, one pound; Yellow Resin, Yellow Wax, of each four ounces; Expressed Oil of Nutmeg, one ounce. To the pitch, resin and wax, melted together, add first the frankincense, then the oil of nutmeg, and mix them together."

Burgundy pitch is in common use as a rubefacient, under the form of plaster. The addition of the other ingredients of this compound plaster, may render it rather more stimulating, and the wax adds to its tenacity, and gives to the plaster a due consistence.

EMPLASTRUM CALEFACIENS. Warm Plaster. Ph. Dub.

"Take of Burgundy Pitch, seven parts; Plaster of Cantharides, one part. Melt them together with a moderate heat, and stir until they attain the consistence of a plaster."

By the addition of this small proportion of cantharides, the stimulating power of the Burgundy pitch is still more increased than by the articles added in the preceding composition. This accordingly affords a very excellent rubefacient, which is frequently employed.

Emplastrum aromaticum. Aromatic Plaster. Ph. Dub.

"Take of Frankincense, three ounces; Yellow Wax, half an ounce; Cinnamon Bark in powder, six drachms; Essential Oil of Pimento, Essential Oil of Lemons, of each two drachms. Melt the frankincense and wax together, and stir, as it thickens on becoming cold. Mix with it the cinnamon, previously rubbed with the essential oils, and form them into a plaster."

This is designed as a stomachic plaster, being applied to the region of the stomach in some forms of dyspepsia. It ought to be always extemporaneously prepared, as the essential oils are soon volatilized.

CATAPLASMATA.—CATAPLASMS.

Cataplasma fermenti. Yeast Cataplasm. Ph. Lond.

"Take of Flour, a pound; Yeast of Beer, half a pint. Mix them, and apply a gentle heat until the mixture begins to rise."

The yeast, mixed with the flour, and aided by the heat applied, soon excites fermentation, and the cataplasm in this state has been applied with much advantage as an anodyne in painful and irritable sores, and as an antiseptic in ulceration, attended with fœtor. Its efficacy appears to depend on the carbonic acid gas evolved by the fermentative process.

Cataplasma sinapis. Mustard Cataplasm. *Ph. Lond. Dub.*

"Take of Mustard Seeds, Lintseed, of each in powder, half a pound; Vinegar, warm, as much as is suffi-

cient. Mix, so as to obtain the consistence of a cataplasm." In the Dublin Pharmacopœia, it is formed from equal quantities of mustard seed in powder and crumbs of bread mixed with as much wine vinegar as is required; and it is added, that the cataplasm may be rendered more stimulating by the addition of two ounces of horse-radish root, finely scraped.

The Mustard Cataplasm, or Sinapism as it is named, is the composition usually applied as a powerful stimulant to the soles of the feet, in typhus, where there is a determination to the head, and in comatose affections. It acts as a very powerful rubefacient; its action is attended with a sense of heat and pain, which soon become urgent, and hence, when applied in a state of coma, the application ought not to be continued too long. It operates on the same principle as a blister, and differs principally in its effect being more quickly obtained, and being more powerfully stimulant to the general system, without producing the same extent of superficial inflammation.

APPENDIX

TO

VOLUME SECOND.

MINERAL Waters are complicated in their composition, and, according to the substances with which they are impregnated, produce different effects on the system, and are hence employed to answer different indications. At the same time, they have certain common medicinal relations. They are therefore not easily arranged under the classes of the Materia Medica, when these are established on analogies in medicinal operation. It is also of advantage to give a connected view of their chemical analysis. I have therefore thought it preferable to place them together, and have accordingly referred them to this appendix. The Elastic Fluids that have been employed medicinally, require a similar arrangement, as there is the same difficulty in placing them under the respective classes of medicines; and from the peculiarities in their preparation and mode of operation, the same advantage in giving their history in connection. I have added a few observations on the medical employment of Electricity and Galvanism, to complete the view of what properly belongs to Materia Medica. And, lastly, as connected with the subject, I have subjoined the heads of a lecture, which I have been accustomed to deliver on the doses of medicines, and the rules that regulate extemporaneous prescription.

I.—OF MINERAL WATERS.

Waters, which flow at the surface of the earth, are frequently impregnated with foreign matter, so far as to acquire peculiar taste or odour, to be capable of exerting specific chemical actions, or to produce changes in the state of the living system. Such waters are denominated Mineral, it being usually matter belonging to the mineral kingdom which communicates these powers.

Important medicinal effects are frequently obtained from mineral waters, arising primarily from the operation of the substances which they hold dissolved, though this is no doubt aided by the state of dilution in which they are administered, the action of the water itself as a diluent, and by other external circumstances. The chemical analysis, therefore, of these waters is of importance, as determining the principles in which their active powers reside, and thus enabling the physician to employ them with more advantage and discrimination.

Mineral waters, both in a chemical classification, and considered in relation to their medicinal use, may be arranged under four orders: Carbonated Mineral Waters, or those impregnated with carbonic acid gas; Sulphureous Mineral Waters, or those impregnated with sulphuretted hydrogen; Saline Mineral Waters, or those which hold certain neutral salts in solution; and Chalybeate Mineral Waters, or those, the properties of which depend on an impregnation of iron. These indeed are not perfectly insulated, but, in general, those of one division have a certain relation to those of the others, by being likewise impregnated with one or other of the ingredients which these contain. But still each may be classed according to its predominant ingredient, or that which gives it its most characteristic chemical and medicinal powers.

It would be foreign to the object of this outline, to give the minute details connected with the analysis of mineral waters. This properly belongs to a System of

Chemistry. It will be sufficient to point out the general modes of analysis, or rather of discovering their principles, and to add to this chemical view, a brief account of their medicinal applications.

I. Carbonated Mineral Waters.—The waters referred to in this class are those which contain carbonic acid gas; and to bring them under the appellation of mineral waters, this must be present in such quantity as to communicate certain sensible qualities. Waters impregnated with free carbonic acid gas, sparkle when drawn from the spring, or poured into a glass; they have a taste more or less pungent and acidulous, but become vapid from exposure to the air. Along with the carbonic acid there may be present, and, indeed, generally are present, portions of saline earthy or metallic matter, chiefly carbonates of lime, magnesia, and iron. But the carbonic acid in excess still communicates the same sensible qualities, modified, particularly with regard to medicinal powers, by these impregnations.

Carbonic acid in excess, in a mineral water, is discovered, when present in any considerable proportion, by the qualities above enumerated, communicated to the water. It is also easily distinguished, even when in more minute quantity, by chemical tests. Infusion of litmus receives from the addition of the water a red tint, which is evanescent, disappearing from exposure to the air, and more quickly when heat is applied. And lime water produces a milkiness or precipitation; the lime, when the water is added in due proportion, forming with the carbonic acid, carbonate of lime, which is insoluble. But the turbid appearance is removed, and the transparency restored, either by adding an additional quantity of the mineral water, the excess of carbonic acid thus communicated rendering the carbonate soluble, or by adding a few drops of nitric or muriatic acid, either of which decomposes the carbonate, and dissolves the lime. By the evanescent redness, carbonic acid is discriminated from any other free acid that a mineral water might

hold dissolved; and by the precipitate formed by lime disappearing from the addition of a larger quantity of the mineral water, or of a little muriatic or nitric acid, the fallacy is guarded against that might arise from any precipitation produced by sulphates that the water might contain.

The quantity of carbonic acid contained in the mineral waters is very various.* Under a common pressure, pure water can absorb its own volume of the gas, but the quantity in any mineral water is generally much inferior to this. The quantity is discovered by expelling the gas from a given quantity of the water, by heating it gradually in a retort nearly filled to the neck, receiving the elastic fluid in a graduated jar, over quicksilver, and observing the diminution of volume it sustains, by the introduction of a solution of potash, this giving the volume of carbonic acid gas.

Waters highly impregnated with carbonic acid gas are grateful from their pungency, sit light on the stomach, and in a large dose produce even sensibly a degree of exhilaration; they increase the appetite, and generally have a diuretic effect. They prove useful in dyspeptic affections, from the grateful and moderate stimulus exerted by the carbonic acid on the stomach, aided by the diluent operation of the water, and hence the advantage derived from them in the numerous chronic affections connected with impaired power of the digestive organs. They generally also contain some saline substances, which communicate additional powers, and the operation of these is usually promoted, or at least they are rendered more grateful, by the carbonic acid. Those which contain carbonate of soda, as Seltzer water, prove more powerfully diuretic, and are employed with advantage, as palliatives in urinary calculus, and in the painful discharge of urine from other affections of the urinary organs. Those impregnated with iron are more particularly employed in those diseases in which that metal is beneficial. Some of the most celebrated mineral waters of Europe belong to this class, such as

the Spa, Pyrmont, and Seltzer Water. The Pyrmont contains very nearly its own volume of the gas; the Seltzer, more than half its volume; the Spa, rather less than half the volume: they besides hold dissolved carbonates of soda, lime, and magnesia; and the Spa and Pyrmont have a considerable impregnation of carbonate of iron. Their more minute analysis will be found in the table at the end of this article. None of the mineral springs of this country are much impregnated with carbonic acid; and those which contain any sensible quantity, as the waters of Bristol and Cheltenham, derive more activity from the presence of other substances.

II. Sulphureous Mineral Waters.—These waters owe their distinguishing character to an impregnation of sulphuretted hydrogen, and they are at once recognised by their peculiar fœtid smell. They are transparent when drawn from the spring, but become turbid from exposure to the air, and gradually lose their odour. When strongly impregnated, they redden infusion of litmus, and even in their weakest state give a dark precipitate with solution of nitrate of silver, or acetate of lead, or tarnish the metals.

To estimate the quantity of sulphuretted hydrogen gas contained in these waters, various methods have been employed. The gas is not easily expelled entirely by heat, nor is it easily collected, so as to measure it accurately, water absorbing it, and quicksilver decomposing it: it may also have an intermixture of carbonic acid gas, and the proportion of this is not easily ascertained, both gases being absorbed by the same liquids. The mode which has been followed is to decompose the sulphuretted hydrogen, by adding to the water, either highly fuming nitrous acid, as long as there is any precipitation of sulphur, (this precipitation being occasioned by the oxygen of the acid combining with the hydrogen of the sulphuretted hydrogen.) or, according to a method preferred by Kirwan, mixing nitric oxide gas with atmospheric air, in a jar over the water, when

nitrous acid is formed, and produces a similar decomposition. The precipitated sulphur is collected on a filter, and from its quantity, the quantity of sulphuretted hydrogen is inferred, 30 grains of sulphur being supposed to be contained in 100 cubic inches of the gas. This estimate, however, of the proportion of sulphur in sulphuretted hydrogen is somewhat uncertain, and the method is liable to fallacy, from the action of the acid becoming weak by its dilution, so as not to precipitate the whole of the sulphur, or, if it be used in excess, from its communicating oxygen, and converting it partially into sulphuric acid.

The sulphurous mineral waters almost uniformly contain saline substances, which modify their powers From the action of the sulphuretted hydrogen, they are employed more particularly in cutaneous affections; and from the combined action of this and the saline matter, which generally has a purgative effect, they are farther used in diseases of the digestive organs, dyspepsia, hypochondriasis, torpor of the intestines, and visceral obstructions; and also in scrofulous affections. They are also applied locally in cutaneous eruptions, and the warm sulphurous baths have been in particular celebrated for their efficacy under this form of application. The principal sulphurous mineral waters of this country are those of Harrowgate and Moffat: the former have a large proportion of saline matter, muriates and carbonates. Those celebrated on the continent are chiefly the warm sulphurous springs of Aix la Chapelle, and Barege.

III. Saline Mineral Waters.—Under this class are comprised those waters in which, without any large proportion of aërial matter, various saline compounds, generally neutral, exist. The salts most usually present are sulphates, muriates, and carbonates; and the bases with which the acids forming these are combined are soda. magnesia. and lime. Their analysis is accomplished, first, by detecting, by the employment of tests, the acids

present and the bases by which these are neutralized; and, secondly, obtaining the entire salts by evaporation, or by the action of certain re-agents.

In these waters, there is often an impregnation of elastic fluid, particularly of carbonic acid, which would modify the results from the application of tests. This, after its nature has been determined by experiment, is expelled by heat, in order to facilitate the farther analysis: and in general also, it is of advantage to reduce the volume of the water by evaporation, as the operation of tests becomes then much more sensible than under a state of great dilution.

Sulphuric acid, in any state of combination in a mineral water, is discovered with great delicacy by muriate of barytes, the barytes attracting it, and forming a compound not sensibly soluble, the production of which, therefore, gives rise to a turbid appearance, and precipitation. The only fallacy that requires to be guarded against is, that the same apparent results may be produced by carbonic acid present in the mineral water, either in a free or combined state; but this is easily discovered by the precipitation or turbid appearance being removed, by the addition of a few drops of nitric acid, or not appearing if this has been added to the mineral water previous to the addition of the muriate of barytes. Other tests of sulphuric acid have been employed, such as superacetate of lead, and nitrate of mercury; but these are both less delicate and less accurate.

Muriatic acid is detected by nitrate of silver, the oxide of silver combining with the muriatic acid, and forming an insoluble compound, which gives to the water first a bluish white turbid appearance, and ultimately precipitates. This test is extremely delicate, or detects the most minute quantity of muriatic acid, and in any state of combination whatever. But it is liable to fallacies, against which it is necessary to guard. The principal of these arise from the presence of carbonic acid or sulphuric acid, either of these giving rise likewise to milkiness and precipitation on the addition of the so-

lution of silver. The operation of carbonic acid is prevented by previously adding a little pure nitric acid to decompose any carbonate: that of sulphuric acid can be obviated only by removing it by the previous addition of nitrate of barytes, as long as any precipitation is induced. If, on adding to the transparent fluid, after these preliminary experiments, the nitrate of silver, any milkiness is produced, this indicates the presence of muriatic acid. Sulphuretted hydrogen gives a precipitate with test; but the nature of this is, from its dark colour, sufficiently evident.

Carbonic acid, in a combined state, is detected by muriate of barytes producing a turbid appearance, and a precipitation, which are removed by the addition of a few drops of nitric acid. Waters containing any considerable impregnation, either of alkaline or earthy carbonates, sensibly affect the vegetable colours, changing, when there is no excess of carbonic acid, or when this is removed by ebullition, the colour of Brazil wood, which is red, to a tint of blue, or restoring the blue tint of litmus which had been reddened by the addition of a little vinegar. When the water is considerably reduced by evaporation, a sensible effervescence is excited on the addition of an acid; and during the evaporation, the earthy carbonates are precipitated, while the alkaline carbonates remain dissolved, and are discovered by their power of changing the yellow colour of turmeric to a brown.

These acids are usually combined with soda, lime or magnesia; and to complete the analysis by the application of tests, these bases must be discriminated.

Lime is detected, with the greatest delicacy of effect, by oxalic acid. The acid indeed with which the lime is combined in the water, when evolved by the action of the oxalic acid, is liable to re-act on the precipitate, and retain it in part dissolved; but this may be guarded against by using oxalate of potash. Magnesia is precipitated by the same acid; but this can scarcely give rise

to any fallacy, as this precipitation takes place very slowly, while that with lime is immediate.

Magnesia is precipitated by ammonia partially, and by lime water entirely; the principal fallacy to which both tests are liable is, that argil is also precipitated by them, and though this earth is not of very common occurrence in mineral waters, it is occasionally found. The best method of distinguishing them is to dry the precipitate, and boil gently a solution of potash on it, this dissolving argil. but leaving magnesia undissolved. Succinate of ammonia, it has lately been discovered, precipitates argil, but not magnesia. In using lime water as the precipitant, it is necessary to guard against the fallacy that may arise from the presence of carbonic acid free or combined, with which the lime may unite, and form a precipitate: this may be avoided by removing any carbonic acid by the previous addition of a little nitric acid. Any sulphuric acid also that may be present ought to be removed by nitrate of barytes, as it might unite with the lime, and give rise to a precipitate of sulphate of lime.

Soda, which is the alkaline base almost exclusively found in mineral waters, cannot be discovered by any test, such as that by which we discriminate the preceding ingredients. The presence of it, therefore, is inferred, when the analysis discovers acids in the water, which are not uncombined, and which, at the same time, cannot be inferred from the application of tests to be in combination with earthy bases. It is also discovered in its state of combination with any of the usual acids by evaporation, carried so far, that its salts are obtained crystallized. By the same method the other compound salts, those having lime, magnesia, or argil, for their base, are discovered, and hence evaporation is always employed in combination with the use of tests in conducting the analysis of a mineral water Different substances separate at different stages of the evaporation, according to their degrees of solubility: the earthy carbonates are usually first precipitated, afterwards the

earthy sulphates, at least the sulphate of lime: the clear liquor poured off and allowed to cool, affords the alkaline neutral salts and sulphate of magnesia by crystallization; the muriates of magnesia and lime usually remain dissolved in the residual liquor, and by these separations the analysis is facilitated.

Advantage is also taken of the powers of alcohol, both as a solvent and as a precipitant, to separate these substances. When the water is reduced to a concentrated state by evaporation, the addition of alcohol throws down certain salts, while others remain dissolved; and of those which are precipitated, some are thrown down by a small quantity of alcohol, or when the evaporation has not been carried far; while others are separated only when the alcohol is added in larger proportion, or when the water is farther evaporated. Thus, sulphate of lime is first precipitated, then carbonate of lime and carbonate of magnesia, afterwards, sulphate of soda and sulphate of magnesia, while the muriates in general remain dissolved. In applying the solvent power of alcohol to facilitate the analysis, the water is evaporated to dryness, and this dry matter is submitted to the action of alcohol; the muriates which are present are in general dissolved, while the sulphates and carbonates remain undissolved.

By these operations, too, the quantities of the respective salts contained in a water are determined; the substances separated being either brought to a certain state of dryness, or being dissolved separately in water and crystallized. The quantities are sometimes inferred, too, by estimation from the precipitates afforded by re-agents; the quantity of sulphuric acid, for example, being determined from the weight of the precipitate of sulphate of barytes, obtained by the addition of muriate of barytes; that of muriatic acid from the weight of the precipitate of muriate of silver, obtained by the addition of nitrate of silver; and that of lime from the weight of the precipitate of oxalate of lime; these quantities being inferred according to the composition of these compounds, as they have been determined by the most accurate ex-

periments. In general, these methods require to be combined to insure accuracy, especially with regard to the determination of proportions.

At the same time, it may be doubted whether the view, which has usually been given with regard to the state in which these substances exist in mineral waters, is just. It has been supposed, that they are dissolved in the water in those forms of binary combination in which they are obtained by evaporation or precipitation; that if muriate of soda, for example, sulphate of magnesia, and carbonate of lime are obtained by these methods, the mineral water held these salts dissolved. Of this, however, there is no proof, and the most correct views of chemical affinity rather lead to the conclusion, that the different acids and different bases exist with their affinities balanced, contributing to mutual neutralization, in simultaneous combination, and that these binary compounds are established only by the exertion of the force of cohesion, and are therefore actually formed by the processes by which they are obtained. If this view be just, the only conclusion that can strictly be drawn from the analysis is, that certain acids and certain bases exist in the mineral water, and it may appear to be superfluous to attempt to determine the quantities of the binary compounds. Still, as reducing the estimation to a standard, this is as useful as any other mode; it corresponds more directly with the results of the experiments which have been hitherto made, and we can, if necessary, infer from the quantities thus determined of the secondary compounds, the proportions of the primary principles.

Saline Mineral Waters are usually aperient, the substances which they hold dissolved being either so far as can be determined inert, such as the sulphate and carbonate of lime, or being cathartic, as the greater number of the other compound salts. It has always been remarked, too, with regard to them, that their cathartic power is greater than could be supposed from the extent of their saline impregnation, as determined by ana-

lysis: a proof of the influence of dilution in the operation of mineral waters. They are usually employed in diseases where it is of advantage to stimulate the digestive system, the intestinal canal, and the secreting organs connected with it, or where advantage is derived from moderate and continued evacuations. Hence their celebrity in the treatment of some forms of dyspepsia and hypochondriasis, chlorosis, chronic hepatitis, jaundice, and in scrofula. The most noted saline water is that of Sedlitz; that of Seltzer, along with a portion of saline matter, has a large impregnation of carbonic acid, and that of Cheltenham, an impregnation both of carbonic acid and iron.

When these waters are impregnated with carbonic acid, which they frequently are, they become more grateful, and sit easier on the stomach. When they have an impregnation of iron, they acquire tonic powers, and more efficacy as remedies in amenorrhœa, and the other chronic diseases in which this metal is employed.

Sea Water, in strict chemical arrangement, must be regarded as belonging to the class of saline mineral waters, as it holds dissolved merely various neutral salts, chiefly muriate of soda and of magnesia, and sulphate of soda and magnesia, with a little sulphate of lime. It much exceeds, however, in the extent of impregnation, any common mineral water: the proportion of saline matter varies in different latitudes, according to the temperature, producing greater or less evaporation, and it is liable to be varied by the discharge of large rivers into the ocean. But on an average, the quantity appears to be about $\frac{1}{29}$, of which, from the experiments of Bergman and Lavoisier, it appears, that about 20 are muriate of soda, 5 muriate of magnesia, 3 sulphates of magnesia and soda, and 1 sulphate of lime. Its medicinal powers are similar to those of the saline mineral waters; from the extent of its saline impregnation, it is more active as a cathartic, and this renders it more stimulating than fresh water as a bath.

IV. Chalybeate Mineral Waters.—These owe their characteristic properties, chemical and medicinal, to an impregnation of *Iron*. The oxide of iron is almost uniformly held dissolved by carbonic acid, the acid being usually in excess; in a few mineral waters, sulphate of iron is present; but these are rare, and are in general too active to be well adapted to medicinal use.

Chalybeate waters have a peculiar styptic taste; they are transparent when taken from the spring, but when exposed for some time to the air, a pellicle forms on the surface, and a quantity, generally minute, of ochry sediment subsides, the water at the same time losing its taste: this change is accelerated by heat.

Iron is discovered, with great facility, by chemical tests. Prussiate of potash detects it by the blue colour to which it gives rise; infusion of galls by the purple colour which it strikes. The latter test is more delicate than the former. and it is much more accurate; the prussiate of potash being always liable to fallacy, from the difficulty of obtaining it free from iron; hence the infusion of galls, or rather the tincture of galls, ought always to be preferred. The principal circumstance to be remarked with regard to its operation, is, that the purple colour which it strikes, by the gallic acid and tannin of the infusion combining with the oxide of iron, is liable to be altered in its tint by the presence of other substances: alkaline and earthy carbonates in particular render it violet: neutral alkaline salts appear to deepen the purple colour, and sulphate of lime renders the precipitate at first whitish, and afterwards black. Carbonate of lime has a singular effect: if the iron is in a low state of oxidation, it heightens the colour; but when the oxidation is greater, it has the opposite effect; and if the quantity of iron be small, the colour may even not appear on the addition of the test. This fact, discovered by Mr. Phillips, enabled him to explain a singular circumstance with regard to the Bath Mineral Water,—that when newly taken from the spring, and while still warm, it gives a purple

colour with galls, indicating the presence of iron; while, after exposure for a little time to the air, no colour appears, though no oxide of iron has been precipitated.

By applying the test of galls before and after boiling the mineral water, we are enabled to discover whether the iron is held dissolved by carbonic or sulphuric acid; the carbonic acid being expelled by the ebullition, and the oxide of iron precipitated, so that after filtration of the liquor when cold, the purple colour does not appear; while the sulphate, though likewise partially decomposed by the ebullition, still so far remains, that a colour not much fainter will be produced. The presence of carbonic or sulphuric acid may also be determined by their usual tests, and sulphate of iron may be obtained by evaporation.

The quantity of oxide of iron may be determined from its precipitation, on exposure to the air; the whole or very nearly the whole of it, when it is combined with carbonic acid, being precipitated, in consequence partly of the escape of the acid, and partly of the iron passing to a higher state of oxidation, so that its attraction to the acid becomes weaker. It has also been estimated from the weight of the precipitate, formed by the addition of prussiate of potash; or, by a more recent and less exceptionable mode, precipitating it by the addition of succinate of soda, and afterwards decomposing the precipitate of succinate of iron, by exposing it to a red heat with a little carbonaceous matter, 100 parts of the oxide obtained by the calcination containing about 70 of iron.

Chalybeate mineral waters are remedies of considerable activity and power. They act as tonics, increasing the strength of the system, raising the force of the circulation, giving tone to the digestive organs, augmenting muscular vigour, and promoting the excretions. They are of course employed in those diseases in which iron is principally used, amenorrhœa, chlorosis, some states of menorrhagia, leucorrhœa, dyspepsia, scrofula, and various forms of chronic debility. And as iron al-

ways succeeds best when given in small doses, and in a state of considerable dilution, the chalybeate waters afford the best form under which it can be prescribed, that which is at once attended with least irritation, and from which the greatest benefit is obtained. The powers of these waters, too, are often aided by the presence of other ingredients. The impregnation of carbonic acid, when it is present in excess, gives them a grateful stimulant quality, which is exerted on the stomach; and saline substances communicate to them an aperient power.

One of the purest chalybeate waters, as will be perceived from the annexed table, is that of Tunbridge. In the celebrated Spa and Pyrmont waters, the impregnation of carbonic acid is so great, as very materially to modify the action of the iron; and in the Cheltenham water, the quantity of active saline matter is such, that it can scarcely be regarded as a chalybeate.

Besides the substances which have been enumerated as forming the preceding classes of mineral waters, there are some principles common to all of them, so as to be occasionally found in those of each class; and there are some also, which are of very rare occurrence, either of which scarcely require more than a concise enumeration.

Atmospheric air is contained in all water that flows at the surface of the earth, and renders it more grateful and light as drink. It scarcely in its entire state appears to be contained in more than the usual proportion in any mineral water, while in those in which other elastic fluids are present in large quantity, it is probably deficient. Neither does it appear that *Oxygen* gas is ever present in a proportion larger than that in which it exists, as a constituent of the atmospheric air in water. The fact, rather singular, has been established, however, that *Nitrogen* gas is afforded by mineral springs. It had often been observed, that in the mineral spring at Buxton, a quantity of elastic fluid was discharged with the water, and a portion escaped on exposure from the water itself.

This was supposed to be carbonic acid; but Dr. Pearson discovered it to be nitrogen gas, mixed with a little atmospheric air, the volume of air amounting to about $\frac{1}{23}$ of the water. It was afterwards discovered by Dr. Garnet in the mineral waters of Harrowgate.

Sulphurous acid gas has been found in some hot mineral waters in the neighbourhood of volcanoes, but is scarcely to be looked for in any other situation. The *Mineral acids* have likewise, though rarely, been found uncombined, or at least in excess *Sulphate of Argil* and *Sulphate of Iron* sometimes occur, arising probably from the oxygenation of aluminous slate impregnated with sulphuret of iron, through which the water has passed. *Muriate of Manganese* has been detected in minute quantity. Lastly, *Silex* exists in solution, especially in hot springs. It is deposited abundantly from the water of the Geyser fountain in Iceland. It is dissolved in the water of the hot springs of Carlsbad, and Dr. Gibbes found it in the Bath waters.

The temperature of Mineral waters gives rise to a very important distinction among them. The greater number are at the average annual temperature of the place where the spring is situated; others are considerably superior to this, or are positively warm. This modifies their powers. The warmth of the tepid waters renders them rather more stimulating when swallowed, a glow of warmth being felt in the stomach, and sometimes the head is slightly affected. Externally applied under the form of the bath, the temperature has even a more important influence on their operation, than any impregnation they may have. In some celebrated mineral springs, the salutary powers appear to depend principally or entirely on the temperature, and on the water acting as a diluent, as in the warm mineral waters of Bristol, Matlock, and Buxton, and in the cold spring of Malvern.

In the following table is presented the results of the analysis of the most celebrated mineral waters. I have

arranged them as nearly as possible according to the preceding classes, though there is considerable difficulty with regard to some of them, which, from the substances they hold dissolved, belong to one class as well as to another. Thus the Spa and Pyrmont waters belong both to the classes of carbonated and chalybeate waters. I have placed them under the former, as the impregnation of carbonic acid is so very considerable, and gives them perhaps their most important properties. Cheltenham water may be placed either as a saline or as a chalybeate water. I have given it the former rank, as the saline matter appears to give it its principal activity. To the four established classes I have added a fifth, those of Pure Waters, or waters so free from any foreign matter that their operation must be ascribed to the fluid acting partly by its temperature, and partly as a diluent. In some of these the analysis indicates a certain portion of foreign matter. But the substances are in general not different from those in common spring water, and are in smaller quantity. I have therefore supposed that they may be arranged under this class, nor have they any of the active powers of the others. There is some difficulty in assigning the place of one of the most celebrated mineral waters, the Bath Water. I have placed it, however, at the head of the pure waters, and immediately after the chalybeate waters, as the impregnation of active matter is inconsiderable, and its operation seems principally dependent on dilution and temperature, modified a little perhaps by the tonic quality of the small portion of carbonate of iron. I have inserted the latest analysis of it, that by Mr. Phillips. With regard to the temperature, I have thought it sufficient to add the epithet cold, where the temperature is not above that of the external atmosphere; where it exceeds this, I have added the precise degrees. The proportions of the ingredients are those contained in a wine gallon of the water.

WATERS.		Nitrogen.	Carbonic acid gas.	Sulphuretted hydrogen gas.	Carbonate of Soda	Carbonate of Magnesia.	Carbonate of Lime.	Sulphate of Soda.	Sulphate of Magnesia.	Sulphate of Lime	Muriate of Soda.	Muriate of Magnesia.	Muriate of Lime.	Oxide of Iron.	Silex.	Temperature
			cub. in.	cub. in.	grains	grains.	grains.	grains	grains.	grains	grains	grains.	grains.	grains.	grs.	
Carbonated.	Seltzer,		138		32	40	24				140					Cold.
	Pyrmont,		208			80	34.8		44.5	68.6	12 4			4.5		Cold.
	Spa,		104		11.7	35.3	11 7				1.37			4.5		Cold.
	Carlsbad,		32 to 50		39		12	70			34.6			0.125	2 5	165°
Sulphureous.	Harrowgate	7	8	19		5.5	18.5		10.5		615.5	91	13			Cold.
	Moffat,	4	5	10							36					Cold.
	Aix le Chap.			Supersulphuretted hydrogen.	90		38				40					143°
Saline	Sedlitz,		8			21	6.7		1444	41 1		36 5				Cold.
	Cheltenham,	12.	30 3	3		12.5			480	40	5	12.5		5		Cold
	Plombieres,				4 4		1	4.7			0.5				2.6	
Chalybeate.	Tunbridge,	5	10.6							1.25	0 5	2.2		1		Cold.
	Brighton,		18							32.7	12.2	6		Sulphate of Iron. 11.2	1 12	Cold.
Pure.	Bath,		9.6				6 4	12		72	26.4			.016	1 6	116
	Buxton,	2					10 5			2.5	1.7			0.25		82°
	Bristol,		30				13.5	11.2		11.7	4	7 25				74°
	Matlock,															66°
	Malvern,															Cold.

The practicability of imitating the mineral waters has engaged the attention of chemists. With regard to the active saline waters, it is easily done, by dissolving the due proportions of the compound salts in water corresponding to the analysis of the water designed to be imitated. We may also impregnate the solution with carbonic acid gas, and even with sulphuretted hydrogen; and by the medium of carbonic acid, it might receive an impregnation of iron. Directions for conducting these processes have been given by Bergman. But in all these cases, there will be wanting the confidence on the part of the patient in the efficacy of the artificial water, which, if not necessary to its success, is at least requisite to its continued and regular use: the external advantages too, attending a visit to a mineral spring, may not always be obtained. Hence these artificial waters designed as substitutes for the natural ones, have never been established in use. Water, impregnated with carbonic acid, with the addition of an alkaline carbonate, which is now in general use, may be considered as operating on a similar principle; and to this super-carbonated soda, or super-carbonated potash water, a small quantity of any of the purgative salts is often added with advantage, communicating to the water an aperient quality, while the taste of the salt is covered, and it is rendered more grateful to the stomach.

II. OF THE GASES EMPLOYED AS REMEDIES.

Substances existing in the aërial form might *a priori* be supposed capable of producing important effects on the system, as by respiration they are brought to act directly on the mass of blood, and induce in it chemical changes. They occasion too immediate and important alterations in the functions of life, some of them producing the highest excitement, others occasioning depression and exhaustion of power.

Though the expectations that were at one time formed, with regard to their medicinal efficacy, have not been realized, and the use of them has now been nearly relinquished; yet since they are capable of producing such changes in the state of the functions, and of the general system, and since the proposition must be admitted, that every substance possessed of these powers may be capable of producing medicinal effects, they ought not to be entirely lost sight of, or be discarded from the Materia Medica. In the aërial kingdom, we have actually the two extremes of Stimulant and Sedative Power, in the examples of nitrous oxide and carburetted hydrogen.

The modes of preparing these gases are, in a great measure, peculiar to each of them. The manner of administering them is nearly the same. They may be breathed from a jar placed in water; but this is laborious, from the effort required to sustain the column of water within the jar. This may be partly remedied by poising the jar in water, or, more completely, by breathing from the gazometer. But the easiest mode is, for the patient to breathe the gas from a silk bag, to which a tube with a stop-cock is affixed.

The gases that have been employed in medicine, may be considered under the divisions of those which *excite*, and those which *depress* the functions of life. To the former order belong,

GAS OXYGENIUM. Oxygen Gas.
GAS OXIDUM NITROSUM. Nitrous Oxide Gas.

Oxygen gas is procured from black oxide of manganese by heat. A quantity of the oxide is put into an iron retort, connected by a tube with a gas holder, or a large jar filled with water, inverted and placed on the shelf of the pneumatic trough. The retort is exposed to a full red heat; at this temperature the affinity of the oxygen to the manganese is so far weakened by the repulsive agency of the caloric, that a large portion of it is separated from the combination, and assumes the elastic form: the gas is transmitted through water, and is allowed to stand over it for some hours before it is breathed.

As oxygen is so immediately necessary to the support of life, it might be supposed, that when afforded in a more pure and concentrated state than that in which we breathe it in atmospheric air, it would prove a salutary agent of no inconsiderable power. To this inference, however, independent of any experience, an objection occurs, founded on some experiments made by Lavoisier, and repeated by Davy, which appear to prove, that when animals are supplied with pure oxygen, or with oxygen mixed with a portion of atmospheric air, less of it is actually consumed than in ordinary respiration. This result appears, however, to have arisen from some fallacy in the experiments. Seguin, in subsequent experiments, found that the consumption of oxygen gas, when it is breathed pure, is at least equal to its consumption in ordinary respiration. And more lately, Messrs. Allen and Pepys have found that in breathing pure oxygen gas, more of it is consumed in a given time, and more carbonic acid formed, that in breathing atmospheric air; they also observed a diminution in the volume of air, or the disappearance of a portion of it; whence they inferred, that, when oxygen is breathed pure, a quantity of it is absorbed by the blood. The positive action of oxygen, in the respiration of it, in its undiluted form, is also shown by the effects which result

from its inspiration, and still more unequivocally by the fact ascertained by Priestly, Lavoisier, and Davy, that animals confined in air, with an increased proportion of oxygen, die before it is exhausted, and even while the air which they breathe contains more oxygen than common air, and can enable another animal to live. It is obvious, therefore, that the animal dies not from deprivation of oxygen, but from some positive power the gas exerts, and probably, as may be inferred, from some appearances which present themselves, from its too highly stimulating power.

Oxygen, when respired, acts partly by communicating a stimulating quality to the blood, by which the left side of the heart and the arterial system are excited to action; hence, when its supply by respiration is suspended, the contractions of the heart become feeble, and at length cease, as Goodwyn demonstrated. The phenomena of asphyxia from its abstraction, prove that it likewise exerts some other operation more immediately subservient to the functions of life; for in that disease the functions of life are suspended, while the contractions of the heart still continue, to a certatn extent, as the experiments of Coleman have shown,

The diseases in which oxygen gas has been administered, are principally those of chronic debility,—chlorosis, asthma, scrofula, dropsy, paralysis, and some cutaneous affections. It requires to be diluted with from ten to twenty or more parts of atmospheric air, increasing the proportion of oxygen according to the effects produced. From one to two quarts of oxygen are given by breathing it in its diluted state, at intervals, in the course of the day. It generally increases the force and velocity of the pulse.

Nitrous oxide gas.—This gas, a compound of oxygen and azote, in the proportion of 37 of the former to 63 of the latter, is most economically obtained. and in greatest purity, from the decomposition of nitrate of ammonia by heat. When this salt is exposed to a tempera-

ture about 400° of Fahrenheit's scale, its principles re-act on each other, and enter into new combinations. The hydrogen of the ammonia attracts part of the oxygen of the nitric acid and forms water; and the remaining oxygen combining with the azote, both of the acid and of the ammonia, forms this particular compound, nitrous oxide, which is disengaged in the gaseous form. After its production it requires to stand some hours, to deposite a small portion of saline matter, before it is fit to be breathed.

The effects of nitrous oxide gas on the system, when it is respired, are scarcely analogous to those of any other agent. The excitement which it produces is extended to the functions of body and mind with more rapidity and force than that arising from the action of the most powerful stimulants. It is accompanied, too, with effects as various as they are peculiar; it excites usually a peculiar thrilling of the body, with feelings of pleasure not easily described; muscular vigour is increased, so that unusual exertions are made with alacrity and ease, and there is even an irresistible propensity to strong muscular exertion; the mind is also affected: there is usually a high degree of exhilaration, yet even when this is greatest, perfect consciousness remains. What still more marks the singularity of its operation, this high excitement of the functions of life and exhilaration of mind are not followed by proportional languor or debility; the state of the system gradually returns to the healthy standard, without any apparent waste of power. A substance capable of acting in such a manner, we might suppose, would prove one of our most valuable remedies. The transient nature of its operation must undoubtedly limit its medicinal efficacy; but still, in diseases of extreme debility, we seem justified in expecting from its administration the most beneficial effects. It has not, however, been very extensively employed. In paralysis it has been used with advantage. In diseases of increased sensibility, it may prove hurtful; and when breathed by delicate females, it has, in

more than one case, induced hysteric affections. The dose which is requisite to produce its peculiar effects varies from four to nine quarts, which may be breathed pure or diluted with an equal part of atmospheric air. It cannot be breathed undiluted for more than four minutes and a half, insensibility being induced. And it requires to be attended to in its administration, that its effects are considerably different in different individuals. On some, its operation has even been productive of unpleasant consequences,—palpitation, fainting, and convulsions.

Nothing satisfactory can be said as to its mode of action, since we know so little of the connection which subsists between the phenomena of life and the chemical changes which are carried on in the system. The experiments of Mr. Davy appear to prove, that it is absorbed by the blood when respired; but, admitting this, we can discover nothing connected with its composition or chemical agency which can lead us to any explanation of its peculiar effects. We can therefore only mark the dissimilarity of its operation to that of any other physical agent.

Under the second subdivision of the Gases, those which depress the functions of life, might probably be placed all the substances existing in the aërial form, oxygen and nitrous oxide excepted. The following are those which have been medicinally employed:

Gas hydrogenium. Hydrogen Gas.
Gas nitrogenium. Nitrogen Gas.
Gas acidum carbonicum. Carbonic Acid Gas.
Gas hydrogenium carburetum. Carburetted Hydrogen Gas.

Hydrogen gas is most easily procured by the action of diluted sulphuric acid on iron or zinc; but as a little acid vapour might be diffused through it, it has been supposed preferable to obtain it, when it is designed to be breathed, by passing water in vapour over pure iron heated to the temperature of ignition. The iron attracts

the oxygen of the water, and the hydrogen assumes the aërial form.

Hydrogen gas received into the lungs does not appear to exert any positive deleterious power: all its effects seem referable merely to the exclusion of oxygen. The respiration of it can accordingly be continued for some time, if it is mixed with a portion of atmospheric air, without any deleterious effect. In a pure state, however, if the lungs have been previously emptied as much as possible of atmospheric air, it cannot be breathed but for a very short time. It quickly occasions a giddiness and sense of suffocation; the countenance becomes livid, and the pulse sinks rapidly, and a state of insensibility is soon induced. When diluted with two thirds or an equal part of atmospheric air, it can be safely breathed; nor does it appear to produce any very important effect. It occasions some diminution of muscular power and sensibility, and a reduction of the force of the circulation. It has been respired, diluted usually with four or five parts of atmospheric air, in catarrh, hæmoptysis, and pthisis; but its powers seem merely those of a palliative, dependent on the partial exclusion of the stimulating power of oxygen.

Nitrogen.—What has been said of hydrogen applies likewise to nitrogen. It seems to exert no positive action on the system, but to produce any effects arising from its inspiration merely by excluding oxygen. As it is not so easily obtained pure as hydrogen gas, it has scarcely, if at all, been employed.

Carbonic acid gas.—This gas is easily procured from the action of diluted sulphuric or muriatic acid on carbonate of lime (chalk or marble;) but to obtain it in a proper state of purity for breathing, it is preferable to decompose the carbonate of lime by exposure to a strong red heat in an iron bottle. The carbonic acid which is disengaged is collected over water, as it is not immedi-

ately largely absorbed by that fluid, and any vapour diffused through it is speedily condensed.

This acid gas, when it is inspired, proves more speedily fatal than nitrogen or hydrogen. It appears from Mr. Davy's experiments on its respiration, to excite spasmodic contraction of the epiglottis, so as to induce suffocation; and it has this effect, even when diluted with nearly an equal part of atmospheric air. Yet the operation of it is more speedily fatal than that of any other agent that acts by occasioning merely suffocation, which would lead to the supposition that it acts by some positive power,—a supposition confirmed too by the fact, that in animals, in whom the symptoms of life have been suspended by its respiration, the irritability of the heart is entirely destroyed.

The respiration of carbonic acid gas was employed at an earlier period than that of the other gases, and sanguine expectations were formed of it as a remedy in phthisis. In the many cases, however, in which it has been tried, though it frequently proved useful for a time, by lessening the expectoration, diminishing the hectic fever, and acting as an anodyne, there is little evidence of its having ultimately effected a cure. The difficulty, indeed, of employing this and all the other gases, is, that of obtaining their continued operation. In that state of disease existing in the lungs, in the earlier stages of phthisis, much advantage, for example, might probably be derived from the continued respiration of a reduced atmosphere, while little can be expected merely from its occasional operation. Carbonic acid gas, when employed, was respired diluted with four or six parts of atmospheric air.

Carbonic acid has likewise been employed as a local application to cancer and painful ulceration, and has at least been serviceable as a palliative. A stream of it is directed on the part by means of a flexible tube, taking care to transmit the gas previously through water, if it has been obtained by the action of an acid of carbonate of lime, and confining it for some time over the sore by

a funnel connected with the tube. A cataplasm, formed of substances in a state of fermentation, has, in some measure, a similar effect, and is more convenient in its application. A formula for this preparation has now a place in the London Pharmacopœia.

Carburetted hydrogen gas.—The gas which has been used in medicine under this name is obtained by passing the vapour of water over charcoal at the temperature of ignition, in an iron tube. The oxygen of the water unites with one part of the charcoal, forming carbonic acid; the hydrogen combines with another part of it, and forms this species of carburetted hydrogen. The carbonic acid is abstracted by agitating the gas in lime water.

This is the most active of those gases which operate by depressing the functions of life, and is perhaps the most powerful agent of this kind. Even when largely diluted with atmospheric air, it occasions immediate vertigo, sickness, dimunition of the force and velocity of the pulse, reduction of muscular vigour, and in general every symptom of diminished power. It can scarcely be breathed in an undiluted state. Mr. Davy found, that at the third inspiration, total insensibility was induced, and symptoms of extreme debility continued for a considerable time. These effects prove its positive deleterious agency.

As a medicinal agent, it is the gas of which the evidence in favour of its efficacy is greatest. In phthisis, in many cases, it unequivocally relieved the symptoms, and at least arrested the progress of the disease; and in diseases of increased action or increased power, much benefit might, from its known operation, be expected from its use. Much caution was found to be requisite in the trials that were made of it, with regard to the dose. At first, one pint of the carburetted hydrogen gas, diluted with twenty parts of atmospheric air, may be respired; the quantity may be slowly increased, and with less dilution, taking care to avoid the production of great vertigo

or muscular debility. Not more than from two to four quarts can be taken in the day, even when the patient has been accustomed to it for some time. It is always more powerful when recently prepared, than when it has been kept for some days, a circumstance requiring to be attended to in the regulation of its dose.

An application of the aërial fluids connected with medicine, is that of neutralizing or destroying noxious or contagious effluvia. These effluvia are probably evolved by chemical processes, and must consist of principles in forms of combination subject to chemical agency. It has accordingly been found, that the air of places offensive from the presence of such effluvia is corrected, and its freshness restored, by the diffusion of those acid gases, the operation of which, in changing the chemical constitution of compound elastic fluids, is most powerful. These are Oxy-muriatic Acid Gas and Nitric Oxide Gas. The power of the former in producing these effects appears, from the evidence brought forward by Guyton, to be unquestionable: considerable benefit appears likewise, from the reports of Dr. Carmichael Smyth, to be derived from the latter. It is however probably inferior to the oxy-muriatic acid gas in activity; but it has the advantage, that fumigation with it in the wards of an hospital, or in similar instances, may be had recourse to without the removal of the sick. The one is disengaged from a mixture of muriate of soda, black oxide of manganese, and sulphuric acid; the other from nitre and sulphuric acid, the mixture being put in small earthen cups, and a moderate heat applied to favour the disengagement of the gas.

ELECTRICITY.

The medicinal operation of electricity may be referred to its stimulating power. It produces forcible contractions in the muscular fibre; excites therefore to action, if duly applied, and, when in excess, immediately exhausts irritability. It possesses the important advantages of being easily brought to act locally, and of being confined to the part to which it is applied, without at all affecting the general system, while it can also be employed in every degree of force.

Electricity is applied medicinally under the form of the stream or continued discharge of the fluid, under that of sparks, and under that of a shock; the first being the most gentle, the second being more active, and the last being much more powerful than either of the others. The stream is applied by connecting a pointed piece of wood, or a metal wire, with the prime conductor of the electrical machine, and holding it by an insulated rod one or two inches distant from the part to which it is to be directed. A very moderate stimulant operation is thus excited, which is better adapted to some particular cases than the more powerful spark or shock. The spark is drawn either by applying a metallic knob connected with a rod in communication with the machine, the operator holding it by a glass handle; or by placing the patient on an insulated stool connected with the prime conductor, and, while the machine is worked, bringing a metal knob within a short distance of the part from which the spark is to be taken; a sensation somewhat pungent is excited, and slight muscular contractions may be produced; these effects being greater or less, according as the spark is more powerful, this being regulated by the distance at which the knob is held, if the machine be sufficiently in action. The shock is given by discharging the Leyden phial, making the part of the body through which it is intended to be transmitted part of the cir-

cuit. The shock is of course stronger as the phial is large, and as it is fully or partially charged; the sensation it excites is unpleasant, and the muscular contractions considerable, if it is of moderate intensity.

At the first introduction of electricity as a remedy, it was very highly celebrated for its efficacy in a number of diseases; its use is now confined to a few. In paralysis it is not unfrequently had recourse to, to excite muscular contraction, and perhaps with some advantage. It is usually applied under the form of sparks, the application of it requiring to be continued daily for a considerable time. Sometimes moderate shocks are also employed; but the propriety of this practice is somewhat doubtful. In amenorrhœa, as the stimulant operation can be excited, in some measure, in the vessels which are affected, advantage may be derived from electricity; and it is occasionally used, both under the form of sparks taken from the pelvis, and that of moderate shocks transmitted through it. Ophthalmia, and some other varieties of inflammation, have been removed by the electric stream; it has also sometimes succeeded in discussing tumours, and relieving pain. The general rule for the medical employment of electricity is to apply it at first under the milder forms, and gradually to raise it, if necessary, to the more powerful, taking care only not to employ it in too high a state of intensity, but in the greater number of cases rather to expect advantage from its continued and moderate use. In the treatment of paralysis, for example, by the application of electricity, the only rational indication is to excite moderate muscular action with the view of increasing the muscular power; to this, sparks of sufficient strength are adequate, and in employing shocks, there is always some risk of exhausting the irritability of the part through which they are transmitted.

GALVANISM.

The peculiar power which is generated when two metals moistened or acted on by certain chemical liquids are in contact, at first named Animal Electricity, since Galvanism, has been applied as a remedy in various morbid affections. Its effects on the animal system are such as warrant this application. Its activity is shown by its exciting, when applied in sufficient intensity, strong sensations in sensible parts, and powerful contractions in parts endowed with irritability.

Between galvanism and electricity there are so many points of resemblance, that they have been considered as ultimately the same power, and there is every reason to admit their identity. Still, from the different states in which they exist, their effects on living matter are not precisely similar. The sensation which galvanism excites, though somewhat analogous to that produced by electricity, is still dissimilar ; and the action of galvanism appears to be more extended, both to the nervous and muscular systems, than that of electricity, which is more local in its action. The galvanic excitation produces sensations and contractions in parts, which from disease, or temporary suspension of power, are not sensible to electrical impressions ; and the stimulant power which both exert, appears in galvanism to be greater in proportion to its intensity than in electricity ; or the sensations and muscular contractions which the galvanic discharge excites, are more than proportional to its power of producing electrical phenomena. Hence it is the most delicate test by which the presence of irritability can be detected.

The diseases in which galvanism has hitherto been employed, are principally those of the nervous kind. In paralysis, it has been affirmed to have restored the capability of muscular contraction, and consequently the power of motion. Cases of chorea, tetanus, and some

other spasmodic affections. have been related, in which perfect cures were accomplished by its application It appears, in several instances, to have relieved deafness, particularly that species of it arising from torpor of the auditory nerve: and it has been successful in discussing indolent tumors. The transient nature of the operation is, with regard to it, as well as electricity, an obstacle to their advantageous application.

Galvanism is applied by connecting two metallic wires with the two extremities of a galvanic battery, and bringing them in contact with the part affected, so that it shall form part of the circuit of the galvanic discharge; the one wire is kept in contact with the part it touches; the other is alternately applied for a moment, and removed, and this is continued for some time. If the skin is moistened, the galvanic influence is communicated more readily and effectually; and still more so if a small piece of metallic leaf, as tinfoil, be laid on the parts to which the wires are applied. Sometimes even the cuticle has been previously removed by a blister, but the application of the galvanism is then attended with pain, and this is altogether unnecessary, if a galvanic apparatus of sufficient power be employed. One constructed of plates of zinc and copper, four inches square, and including from 25 to 50 of each metal, is sufficient for the greater number of purposes, a greater or less number of the plates being included in the circuit, according to the strength of the application required. The liquid best adapted to excite it is a solution of muriate in soda, with a little muriatic acid, diluted nitric acid, though rather more powerful, having its power sooner exhausted.

ON MEDICAL PRESCRIPTIONS.

The principal objects designed to be attained by the Composition of Medicines, are, to communicate an agreeable taste or flavour; to give a convenient form; to correct the operation of the principal medicine, or obviate some unpleasant symptom it is liable to produce; to promote its action, by the substance combined with it exerting one of a similar kind; to obtain the joint operation of two remedies, which have different powers, but which may be required to obviate different morbid symptoms present together; or. lastly, to change their usual effects, and obtain a remedy different from either, by the power which one may have of modifying the action of another.

A prescription has been usually divided into four parts, which compose it,—the *basis*, or principal ingredient of the prescription; the *adjuvans* or that which is designed to promote the action of the former; the *corrigens*, or that intended to correct its operation, or obviate any unpleasant symptom which it may be apt to produce; and the *constituens*, or the substance which gives to the other ingredients consistence or form. These are not necessarily present in every formula, as some of these purposes may not require to be attained; nor is the division of much importance, except perhaps as affording the best general rule for regulating the order in which the ingredients of a prescription should be enumerated, the order being conformable to that which corresponds with this arrangement.

The following are the principal circumstances to be attended to in forming a prescription.

1*st*, Simplicity should be attained, so far as it is consistent with the objects of the prescription. Nothing ought to enter into the composition which does not add to its virtue, render it less ungrateful, give it a convenient

form, or which is not necessary to conceal any particular ingredient; and, in general, the practice of accumulating a number of articles in one prescription is to be avoided, as there is always the risk of one counteracting or modifying the action of another, and the addition of less active substances can do little more than add to the bulk of the medicine, or cause it to sit uneasy on the stomach.

2dly, Substances, it is evident, ought not to be mixed together, which are capable of entering into chemical combination, or of decomposing each other, unless it be with the view of obtaining the product of the combination, or decomposition, as a remedy.

3dly, Those mixtures are also to be avoided, in which one medicine, by its peculiar action on the stomach or general system, modifies and changes the action usually exerted by another, unless where the object is to obtain the effects of that modified operation.

4thly, The error of contra-indication is to be guarded against, or those medicines ought not to be combined, the virtues of which are not merely different, but are, in some measure, opposed to each other,—an error not very likely to occur with regard to the principal ingredients of a prescription, but which may happen with regard to those of inferior importance.

5thly, The ingredients which are to be mixed, must be such as will mix properly together, so that the form in which the remedy is designed to be exhibited may be easily obtained and preserved.

Lastly, The form under which a medicine is prescribed must be adapted to certain circumstances principally to the nature of the disease, the nature of the remedy itself, and, as far as can be conveniently attained, to the taste of the patient. Those medicines which are nauseous, which operate in a small dose, or which are designed to operate slowly, are usually given under the form of pill, or sometimes of bolus. Those which are less ungrateful, or the operation of which is designed to be immediately obtained, are given under some liquid

form. Tinctures always require to be diluted : infusions or decoctions may in general be given in the state in which they are prepared.

The Doses of Medicines are not reducible to any general rules, from their general similarity of operation, or any other circumstance, and are therefore specific with regard to each substance. But there are certain general circumstances by which their operation is influenced, which require to be attended to in apportioning the dose. These are, Age, Sex, Temperament, Idiosyncrasy, Habit, and Disease.

Age.—From infancy to manhood, a larger dose of any medicine is requisite to produce its effect, in proportion to the advance in life. From manhood to old age, there is a similar gradation with regard to diminution of dose, though in a much less proportion than that which regulates the increase. The following table given by Gaubius has been supposed to show these proportions.

TABLE.

Let the dose for a person of middle age be	1 or 1 drachm.
For one from xiv to xxi years, it will be -	$\frac{2}{3}$ or 2 scruples.
vii to xiv, - - - -	$\frac{1}{2}$ or half a dr.
iv to vii, - - - -	$\frac{1}{3}$ or 1 scruple.
of iv years of age, - - -	$\frac{1}{4}$ or 15 grains.
iii - - -	$\frac{1}{6}$ or half a scr.
ii - - -	$\frac{1}{8}$ or 8 grains.
i - - -	$\frac{1}{12}$ or 5 grains.

Sex.—Women, in general, require smaller doses of any medicine than men—a difference which is probably owing principally to their greater sensibility from their habits of life.

Temperament.—By temperament is understood a predisposition, derived from original conformation, to be affected in a more peculiar manner by external causes

acting on the system; and much laborious investigation has been bestowed in distinguishing the different temperaments, and the diversities to which they give rise. Those of the sanguine temperament are supposed to be more affected by medicines, and therefore to require smaller doses than those of the phlegmatic or melancholic; but in what has been said on this subject there is so much uncertainty and hypothesis, that little reliance can be placed on it.

Idiosyncrasy.—This denotes that disposition in individuals, unconnected with general temperament, to be affected by certain causes, in a manner different from the generality of mankind. Such idiosyncrasies are observed with regard to medicines, as well as to other agents, and, where they are known, may require to be attended to by the prescriber.

Habit.—This has an important influence on the operation of medicines. In general, they lose part of their power by having been long continued, and the doses of them, therefore, require to be enlarged under their protracted use. This is particularly the case with all strong stimulants and narcotics, and is even observed, to a certain extent, in some of the other classes of the Materia Medica. In a few instances, the reverse has been supposed to hold true, as for example with regard to the saline cathartics.

Disease.—This has an influence on the doses of medicines not less important; the susceptibility to external impressions, and to action, being much varied in morbid affections, and the operations of remedies of course being modified by such variations. The state of susceptibility being in general apparent, when it varies much from the healthy standard, the doses of the medicines administered are regulated accordingly, and this, it is obvious, admits of no general observations, as being entirely dependent on the nature and state of disease.

TABLES

OF

CHANGED NAMES.

TABLES

OF

CHANGED NAMES

IN THE

NEW EDINBURGH AND LONDON PHARMACOPŒIAS.

In drawing up these Tables, it has not been thought necessary to insert the names of the Simple Medicines, as both the proper names of the articles, according to the nomenclature of natural history and their common or trivial names, are inserted in the index to the work ; and thus the old or the new name of any simple substance may be easily found. In these Tables, therefore, the names of the Compound Medicines only are inserted, and the catalogue of them has been extended so far as to include not only the synonyms inserted in the present editions of the London and Edinburgh Pharmacopœias, but a nnmber of older names, once generally established, and still occasionally used. I ought, in the body of the work, to have referred to the very just and forcible observations of Dr. Bostock, (Remarks on Pharmaceutical Nomenclature,) on the inconvenience attending the innovations in the established language of Materia Medica and Pharmacy, as well as the impropriety of too strict an adherence to the nomenclature of chemistry, and of the adoption of the language of natural history, in the extent to which this has been carried by the colleges in the late editions of their Pharmacopœias.

TABLE I.

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Acetum distillatum	Acidum acetosum distillatum	Acidum aceticum
Acidum vitriolicum	sulphuricum	sulphuricum
Ærugo æris	Sub-acetis cupri	Sub-acetas cupri impura
Æthiops mineralis	Sulphuretum hydrargyri nigrum	
Æther vitriolicus	Æther sulphuricus	Æther sulphuricus
Alkali fixum fossile	Soda	Soda
vegetabile	Potassa	Potassa
volatile	Ammonia	Ammonia
Alumen	Sulphas Aluminæ	Super-sulphas aluminæ et potassæ
Ammonia præparata	Carbonas ammoniæ	Ammoniæ carbonas
Antimonium	Sulphuretum antimonii	Antimonii sulphuretum
præparatum	præparatum	
calcareo-phosphoratum	Oxidum antimonii cum phosphate calcis	Pulvis antimonialis
muriatum	Murias antimonii	
tartarisatum	Tartris antimonii	Antimonium tartarisatum
vitrificatum	Oxidum antimonii cum sulphure	
Aqua ammoniæ acetatæ	Aqua acetitis ammoniæ	Liquor acetatis ammoniæ
causticæ	ammoniæ	ammoniæ
cupri vitriolati composita	Solutio sulphatis cupri composita	
fortis	Acidum nitrosum dilutum	Acidum nitrosum dilutum
lixivia caustica	Aqua potasæ	Liquor potassæ
lithargyri acetati		plumbi acetatis

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Aqua lithargyri acetati composita		Liquor plumbi acetatis dilutus
sapharina		Liquor cupri ammoniati
styptica	Solutio sulphatis cupri composita vitrificatum	
Argentum nitratum	Nitras argenti	Argenti nitras
Balsamum canadense	Resina liquida pini balsameæ	Teribinthina canadensis
anodinum	Tinctura saponis cum opio	
saponaceum	saponis	Linimentum saponis compositum
sulphuris	Oleum sulphuratum	Oleum sulphuratum
traumaticum	Tinctura benzoes composita	Tinctura benzoini composita
Butyrum antimonii	Murias antimonii	
Calaminaris lapis	Carbonas zinci impurus	Calamina
Calomelas	Sub-murias hydrargyri	Hydrargyri sub-murias
Calx hydrargyri alba		Hydrargyrus præcipitatusalbus
Causticum commune acerrimum	Potassa	Potassa fusa
mitius	Potassa cum calce	Potassa cum calce
Cancrorum lapilli	Carbonas calcis durior	
Causticum lunare	Nitras argenti	Argenti nitras
Cerussa	Oxidum plumbi album	Plumbi carbonas
Cerussa acetata	Acetis plumbi	super-acetas
Cinnaberis factitia	Sulphuretum hydrargyri rubrum	Hydrargyri sulphuretum rubrum
Confectio cardiaca	Electuarium aromaticum	Confectio aromatica
japonica	catechu	

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Crocus antimonii, vel crocus metallorum	Oxidum antimonii cum sulphure per nitratem potassæ	
Creta preparata	Carbonas calcis mollior	
Cuprum ammoniacum	Amoniaretum cupri	Cuprum amoniatum
vitriolatum	Sulphas cupri	Cupri sulphas
Crystalli tartari	Super-tartris potassæ	Potassæ super-tartras
Decoctum album		Mistura cornu usti
chamæmeli, vel commune	Decoctum anthemidis nobilis	
lignorum	guaiaci compositus	
pro enemate		malvæ compositum
fomento		papaveris
Elaterium	Succus spissatus momordicæ elaterii	
Electuarium lenitivum	Electuarium cassiæ sennæ	Confectio sennæ
thebaicum	opiatum	opii
Elixir paregoricum	Tinctura opii amoniata	Camphoræ composita
proprietatis	aloes cum myrrha	Tinctura aloes composita
vitriolicum	aloes ætherea	
sacrum	rhei et aloes	
salutis	cassiæ sennæ composita	sennæ
stomachicum	gentianæ composita	gentianæ composita
vitrioli acidum	Acidum sulphuricum aromaticum	
Emplastrum adhæsivum	Emplastrum resinosum	Emplastrum resinæ
attrahens	simplex	ceræ
cantharidum	meloes vesicatorii	lyttæ

OLD NAMES	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Emplastrum cereum	Emplastrum simplex	Emplastrum ceræ
commune	oxidi plumbi semivitrei	plumbi
lithargyri	oxidi plumbi simivitrei	plumbi
roborans	ferri rubri	
vesicatorium	meloes vesicatorii	cantharidis
Emulsio communis	Emulsio amigdalæ communis	Mistura amigdalæ
Extractum catharticum		Extractum colocynthidis compositum
Ferri rubigo	Carbonas ferri præparatus	
squamæ	Ferri oxidum nigrum	
Ferrum amoniatum	Murias ammoniæ et ferri	Ferrum amoniatum
vitriolatum	Sulphas ferri	Ferri sulphas
ustum	Oxidum ferri rubrum	
Flores benzoini	Acidum benzoicum	Acidum benzoicum
martiales	Murias ammoniæ et ferri	Ferrum ammoniatum
sulphuris	Sulphur sublimatum	Sulphur sublimatum
zinci	Oxidum zinci	Zinci oxidum
Hepar sulphuris	Sulphuretum potassæ	Potassæ sulphuretum
Hiera picra		Pulvis aloes cum canella
Hydrargyrus acetatus	Acetis hydrargyri	
calcinatus		Hydrargyri oxidum rubrum
muriatus corrosivus	Murias hydrargyri	oxymurias
mitis	Sub-murias hydrargyri	sub-murias
præcipitatus	præcipitatus	
nitratus ruber	Oxidum hydrargyri per acidum nitricum	nitrico-oxidum

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Hydrargyrus præcipitatus cinerius	Oxidum hydrargyri cinereum	Hydrargyri oxidum cinereum
sulphuratus niger	Sulphuretum hydrargyri nigrum	
sulphuratus ruber		sulphuretum rubrum
vitriolatus flavus	Sub-sulphas hydrargyri flavus	
Infusum amarum	Infusa gentianæ compositum	Infusum gentianæ compositum
rosarum	rosæ galicæ	rosæ
Julepum e camphora		Mistura camphoræ
Kali	Potassa	Potassa
Lac sulphuris		Sulphur præcipitatum
amigdalæ	Emulsio amigdalæ	Misturæ amigdalæ
ammoniaci		ammoniaci
assafœtidæ		assafœtidæ
guaiaci		guaiaci
Laudanum liquidum	Tinctura opii	Tinctura opii
Linimentum anodynum	Tinctura saponis cum opio	
aquæ calcis	Oleum lini cum calce	
opiatum	Tinctura saponis cum opio	
saponaceum	saponis	Linimentum saponis compositum
volatile	Oleum ammoniatum	ammoniæ sub-carbonatis
Lithargyrus	Oxidum plumbi semi-vitreum	Plumbi oxydum semivitreum
Lixivia	Potassa	Potassa
Lixivium causticum	Aqua potassæ	Liquor potassæ
tartari		sub-carbonatis

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Magnesia alba	Carbonas magnesiæ	Magnesiæ carbonas
usta	Magnesia	Magnesia
vitriolata	Sulphas magnesiæ	Magnesiæ sulphas
Mel Ægyptiacum		Linimentum æruginis
rosaceum		Mel rosæ
acetatum		Oxymel
Mercurius	Hydrargyrus	Hydrargyrus
calcinatus		Hydrargyri oxidum rubrum
corrosivus sublimatus	Murias hydrargyri	oxymurias
ruber } praecipitatus ruber }	Oxidum hydrargyri rubrum per acidum nitricum	nitrico-oxydum
dulcis sublimatus	Sub-murias hydrargyri	sub-murias
emeticus flavus	Sub-sulphas hydrargyri	
præcipitatus albus		Hydrargyrus præcipitatus
Minium	Oxidum plumbi rubrum	
Natron	Soda	Soda
Nitrum	Nitras potassæ	Potassæ nitras
Oleum teribinthinæ	Oleum volatile pini	Oleum teribinthinæ
Oxymel æruginis		Linimentum æruginis
Philonium Londinense		Confectio opii
Pilulæ cupri	Pilulæ ammoniareti cupri	
gummosæ		Pilulæ galbani composita
rufi	aloes cum myrrha	aloes cum myrrha

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Pilulæ thebaicæ	Pilulæ aloes opiatæ	Pilulæ saponis cum opio
Potio cretacea	Potio carbonatis calcis	Mistura cretæ
Pulvis antimonialis	Oxidum antimonii cum phosphate calcis	Pulvis antimonialis
Pulvis e bolo compositus cum opio		Pulvis cretæ compositus cum opio
cretaceus	Pulvis carbonatis calcis compositus	cretæ compositus
doveri	ipecacuanhæ et opii	ipecacuanhæ compositus
sternutatorius	asari compositus	
stypticus	sulphatis aluminæ compositus	
Resina alba		Resina pini
Rubigo ferri præparata	Carbonas ferri præparatus	
Saccharum saturni	Acetis plumbi	Plumbi super-acetas
Sal absinthii	Carbonas potassæ	Potassæ sub-carbonas
alkalinus fixus fossilis	sodæ	Sodæ sub-carbonas
alkalinus fixus vegetabilis	potassæ	Potassæ sub-carbonas
ammoniacus	Murias ammoniæ	Ammoniæ murias
volatilis	Carbonas ammoniæ	carbonas
catharticus amarus	Sulphas magnesiæ	Magnesiæ sulphas
glauberi	sodæ	Sodæ sulphas
cornu cervi	Carbonas ammoniæ	Ammoniæ carbonas
diureticus	Acetis potassæ	Potassæ acetas
glauberi	Sulphas sodæ	Sodæ sulphas
marinus	Murias sodæ	murias
martis	Sulphas ferri	Ferri sulphas

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Sal polycrestus	Sulphas potassæ cum sulphure	
rupellensis	Tartris potassæ et sodæ	Soda tartarizata
tartari	Carbonas potassæ	Potassæ sub-carbonas
Saturni extractum		Liquor plumbi acetatis
Soda purificata	sodæ	Sodæ sub-carbonas
muriata	Murias sodæ	murias
phosphorata	Phosphas sodæ	
tartarisata	Tartris potassæ et sodæ	Soda tartarizata
vitriolata	Sulphas sodæ	Sodæ sulphas
Spiritus ætheris vitriolici	Æther sulphuricus cum alcohole	Spiritus ætheris sulphurici
ammoniæ	Alcohol ammoniatum	ammoniæ
aromaticus	aromaticum	aromaticus
fœtidus	fœtidum	fœtidus
camphoratus	Tinctura camphoræ	camphoræ
cornu cervi	Aqua carbonatis ammoniæ	Liquor ammoniæ carbonatis
mindereri	acetitis ammoniæ	acetatis
nitri dulcis	Spiritus ætheris nitrosi	Spiritus ætheris nitrici
glauberi	Acidum nitrosum	
salis ammoniaci	Aqua ammoniæ	Liquor ammoniæ
marini glauberi	Acidum muriaticum	Acidum muriaticum
vinosus camphoratus	Tinctura camphoræ	Spiritus camphoræ
rectificatus	Alcohol	rectificatus
tenuior	dilutum	tenuior
vitrioli dulcis	Æther sulphuricus cum alcohole	ætheris sulphurici
volatilis aromaticus	Alcohol ammoniatum aromaticum	ammoniæ aromaticus
fœtidus	fœtidum	fœtitidus

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Succi ad scorbuticos	Succus cochleariæ compositus	
Sulphur antimonii præcipitatum / auratum antimonii	Sulphuretum antimonii præcipitatum	Antimonii sulphuretum præcipitatum
Sulphuris flores	Sulphur sublimatum	Sulphur sublimatum
Syrupus balsamicus	Syrupus toluiferæ balsami	Syrupus tolutanus
e meconio	papaveris somniferi	papaveris
Tartarus crudus	Super-tartris potassæ impurus	
Tartari crystalli	potassæ	Potassæ super-tartras
Tartarus emeticus	Tartris antimonii	Antimonium tartarizatum
Tartarum solubile	potassæ	Potassæ tartras
vitriolatum	Sulphas potassæ	sulphas
Tinctura aloes vitriolata	Tinctura aloes ætherea	
amara	gentianæ composita	Tinctura gentianæ composita
aromatica	cinnamomi composita	cinnamomi composita
cantharidum	meloes vesicatorii	lyttæ
ferri	muriatis ferri	ferri muriatis
fœtida	ferulæ assæfœtidæ	assæfœtidæ
guaiacina volatilis	guaiaci ammoniata	guaiaci ammoniata
japonica	mimosæ catechu	catechu
martis	muriatis ferri	ferri muriatis
melampodii	hellebori nigri	hellebori nigri
opii camphorata		camphoræ composita
rhei amari	rhei et gentiana	
rosarum	Infusum rosarum	Infusum rosæ
sacra	Vinum aloes socotorinæ	Vinum aloes

OLD NAMES.	NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.
Tinctura thebaica	Tinctura opii	Tinctura opii
tolutana	toluiferæ balsami	
valerianæ volatilis		valerianæ ammoniata
Trochisci arabici	Trochisi gummosi	
Turpethum minerale	Sub-sulphas hydrargyri flavus	
Tutia	Oxidum zinci impurum	
Unguentum album	Unguentum oxidi plumbi albi	
basilicum flavum	resinosum	Ceratum resinæ flavæ
cœruleum	hydrargyri	Unguentum hydrargyri
citrinum	nitratis hydrargyri	nitratis
epispasticum fortius	pulveris meloes vesicatorii	Ceratum lyttæ
mitius	infusi mel. vesicat.	
saturnimum	acetitis plumbi	Ceratum plumbi super-acetatis
Vinum amarum	Vinum gentianæ compositum	
antimoniale	tartritis antimonii	Liquor antimonii tartarizati
chalibeatum		Vinum ferri
Vitriolum album	Sulphas zinci	Zinci sulphas
cœruleum	cupri	Cupri sulphas
viride	ferri	Ferri sulphas
Vitrum antimonii	Oxidum antimonii cum sulphure vitrificatum	
Zincum ustum	Oxidum zinci	Zinci oxidum
vitriolatum	Sulphas zinci	sulphas

TABLE II.

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES.
Acetis plumbi	Plumbi super-acetas	Saccharum saturni
potassæ	Potassæ acetas	Sal diureticus Lixiva acetata
Acidum benzoicum	Acidum benzoicum	Flores benzoini
nitrosum dilutum	Acidum nitricum dilutum	Aqua fortis
sulphuricum	sulphuricum	Acidum vitriolicum
aromaticum		Acidum vitrioli aromaticum Elixir vitrioli acidum
Æther sulphuricus	Æther sulphuricus	Æther vitriolicus
Alcohol	Alcohol	Spiritus vinosus rectificatus
Alcohol ammoniatum	Spiritus ammoniæ	Spiritus ammoniæ
aromaticum	aromaticus	aromaticus
fœtidum	fœtidus	fœtidus
Ammonia	Ammonia	Alkali volatile
Ammoniaretum cupri	Corpum ammoniatum	Cuprum ammoniacum
Aqua acetitis ammoniæ	Liquor ammoniæ acetatis	Spiratus mindereri
ammoniæ		Aqua ammoniæ causticæ
carbonatis ammoniæ	ammoniæ carbonatis	Spiritus cornu cervi Aqua ammoniæ
potassæ	potassæ	lixivia caustica Lixivium causticum
Carbonas ammoniæ	Ammoniæ carbonas	Sal ammoniacus volatilis cornu cervi

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES.
Carbonas calcis	Creta preparata	Creta alba Lapilli cancrorum
ferri præparatus		Rubigo ferri præparata
magnesiæ	Magnesiæ carbonas	Magnesia alba
potassæ,	Potassæ sub-carbonas	Sal alkalinus fixus vegetabilis tartari
sodæ	Sodæ sub-carbonas	Sal alkalinus fixus fossilis Soda purificata
zinci impurus	Calamina præparata	Lapis calaminaris
Decoctum guaiaci compositus		Decoctum lignorum
Electuarium aromaticum	Confectio aromatica	Confectio cardiaca
cassiæ sennæ	sennæ	Electuarium lenitivum
catechu		Confectio japonica
opiatum	opii	Electuarium thebaicum
Emplastrum meloes vesicatorii	Emplastrum lyttæ	Emplastrum vesicatorium
oxidi ferri rubri		roborans
plumbi semivitrei	plumbi	commune
resinosum	resinæ	adhæsivum
simplex	ceræ	cereum
Emulsio amygdalæ communis	Mistura amygdalæ	Emulsio communis
Murias ammoniæ	Ammoniæ Murias	Sal amoniacus
et ferri	Ferrum ammoniatum	Flores Martiales
antimonii		Butyrum antimonii

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES.
Murias hydrargyri	Hydrargyra oxymurias	Hydrargyrus muriatus corrosivus
sodæ	Sodæ murias	Sal marinus
Nitras argenti	Argenti nitras	Causticum lunare
potassæ	Potassæ nitras	Nitrum
Oleum ammoniatum	Linimentum ammoniæ	Linimentum volatile
lini cum calce		aquæ calcis
sulphuratum	Oleum sulphuratum	Balsamum sulphuris
Oxidum antimonii cum phosphate calcis	Pulvis antimonialis	Antimonium calcareo-phosphoratum
Oxidum antimonii cum sulphure per nitratem potassæ		Crocus antimonii, vel crocus metallorum
Oxidum antimonii cum sulphure vitrificatum		Vitrium antimonii
Oxidum ferri nigrum		Ferri squamæ
rubrum		Ferrum vitriolatum ustum
hydrargyri per acidum nitricum	Hydrargyri nitrico-oxydum	Hydrargyrus nitratus ruber
hydrargyri cinereum	oxidum cinereum	præcipitatus cinereus
plumbi album	Plumbi sub-carbonas	Cerussa
rubrum		Minium
semivitreum	oxydum semivitreum	Lithargyrus
zinci	Zinci oxydum	Flores zinci
impurum		Tutia

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES.
Phosphas sodæ		Soda phosphorata
Pini abietis resini	Pix arida	Pix Burgundica
balsameæ resini	Terebinthina canadensis	Balsamum canadense
laricis oleum	Oleum terebinthinæ	Oleum terebinthinæ
Potassa	Potassa	Alkali fixum vegetabile
		Causticum commune acerrimum
cum calce	Potassa cum calce	Causticum commune mitius
Potio carbonatis calcis	Mistura cretæ	Potio cretacea
Pulvis carbonatis calcis compositus	Pulvis cretæ compositus	Pulvis cretaceus
Soda	Soda	Alkali fixum fossile
Solutio sulphatis cupri composita		Aqua stiptica
Spiritus ætheris nitrosi	Spiritus ætheris nitrici	Spiritus nitri dulcis
Sub-acetas cupri	Ærugo	Ærugo æris
sub-murias hydrargyri	Hydrargyri sub-murias	Calometas
		Hydrargyrus Muriatus mitis.
Sub-sulphas hydrargyri flavus		Turpethum minerale
Succus spissatus momordicæ elaterii		Elaterium
Sulphas aluminæ	Alumen	Alumen
cupri	Cupri sulphas	Vitriolum cœruleum
ferri	Ferri sulphas	Sal martis
		Vitriolum viride
magnesiæ	Magnesiæ sulphas	Sal catharticus amarus
potassæ	Potassæ sulphas	Tartarum vitriolatum
potassæ cum sulphure		Sal polychrestus
sodæ	Sodæ sulphas	glauberi

NAMES IN THE ED. PH.	NAMES IN THE LOND. PH.	OLD NAMES
Sulphas zinci	Zinci sulphas	Vitriolum album
Sulphur sublimatum	Sulphur sublimatum	Flores sulphuris
Sulphuretum antimonii	Antimonii sulphuretum	Antimonium
antimonii præcipitatum	sulphuretum præcipitatum	Sulphur antimonii præcipitatum
		auratum antimonii
hydrargyri nigrum		Æthiops mineralis
rubrum	Hydrargyri sulphuretum rubrum	Cinnabaris factitia
potassæ	Potassæ sulphuretum	Hepar sulphuris
Syrupus toluiferæ balsami	Syrupus tolutanus	Syrupus balsamicus
Super-tartris potassæ	Potassæ super-tartras	Tartari crystalli
Tartris antimonii	Antimonium tartarisatum	Tartarus emeticus
potassæ	Potassæ tartras	Tartarum solubile
potassæ et sodæ	Soda tartarizata	Sal rupellensis
Tinctura benzoes composita	Tinctura benzoini composita	Balsamum traumaticum
camphoræ	Spiritus camphoræ	Spiritus vinosus camphoratus
muriatis ferri	ferri muriatis	Tinctura martis
opii ammoniata	camphoræ composita	Elixir paregoricum
saponis	Linimentum saponis	Linimentum saponaceum
saponis cum opio		opiatum
		anodynum
Unguentum nitratis hydrargyri	Unguentum hydrargyri nitratis	Unguentum citrinum
acetitis plumbi	Ceratum plumbi super-acetatis	saturninum
pulveris meloes vesicatorii	lyttæ	epispasticum fortius
resinosum	resinæ	basilicum flavum

ENGLISH INDEX.

A.

LATIN INDEX.

FINIS.